Volume 19, No. 1 January 2000

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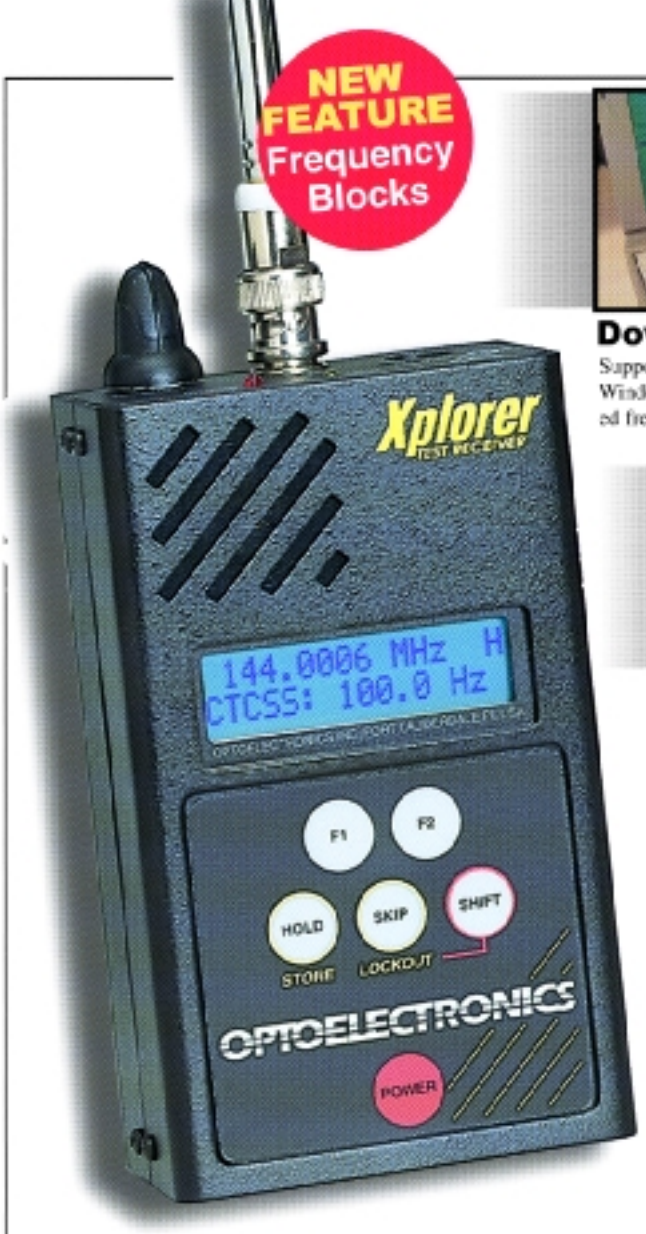


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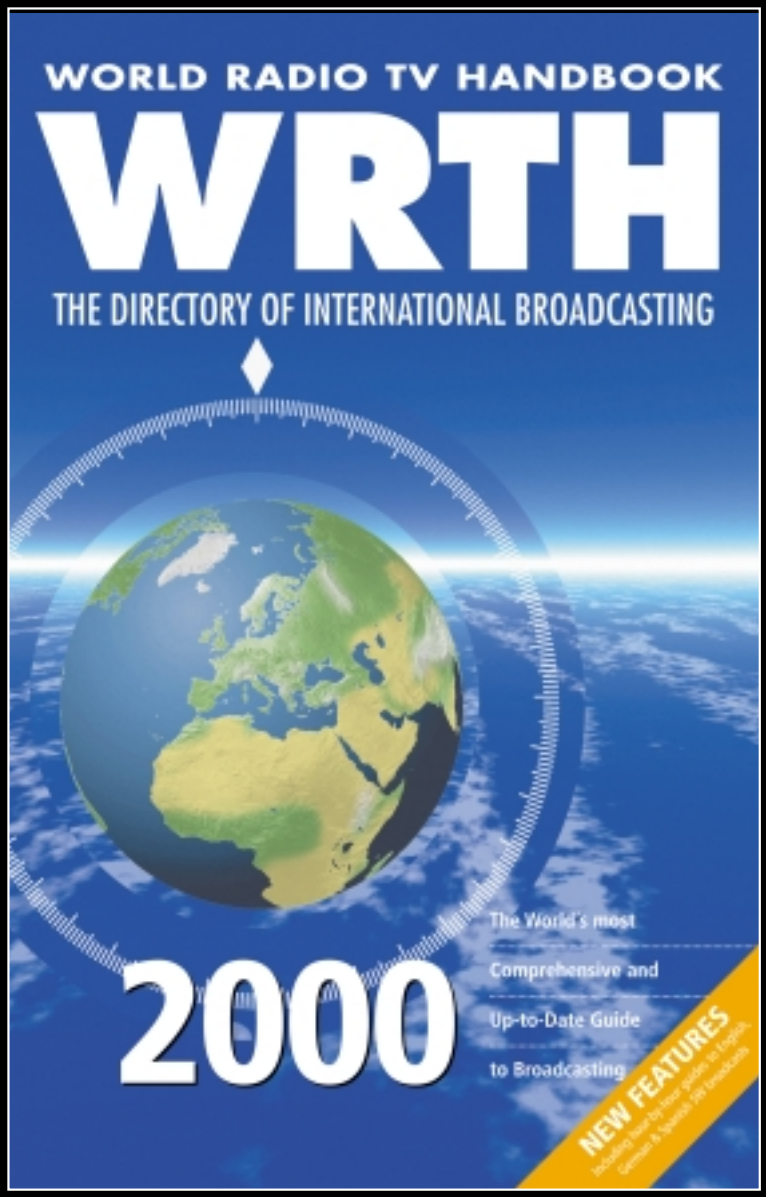


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Monitoring Times

Vol. 19, No. 1 January 2000


*Cover Story*

## American FM Radio in the New Millennium

**By Ken Reitz**

What will radio stations of the future look like? If we're lucky, they'll look a lot like WCPE-FM, North Carolina's home of great classical music. If you haven't heard WCPE, they're not hard to find; just tune them in on FM if you live in eastern North Carolina or Virginia, or find them on the Galaxy 5 satellite, or on the internet, or even on your cable service!

The secret of WCPE's success is the vision and energy of Deborah Proctor, who founded the station after graduating as an engineer. After 20 years of building a strong base of community and financial support, the station is a model in technology and public service. WCPE recently extended its local reach with a new 74-foot antenna on top of its dizzying 1,200 foot tower (cover photo courtesy WCPE). Story starts on page 10.

# CONTENTS

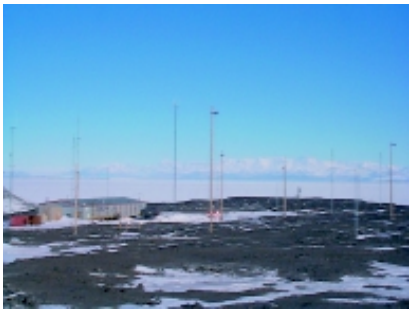


**By Don Moore**

Richard Byrd's first expedition to Antarctica in 1928 made good use of radio communications and radio broadcasts. Though Byrd knew how to play to a radio audience and please his financial backers, his comments on radio sound like a modern-day discussion on cellphones – "its help is priceless. But I can see where it is going to destroy all peace of mind..." Byrd was right about its help: radio saved his life during both his expeditions to the South Pole.



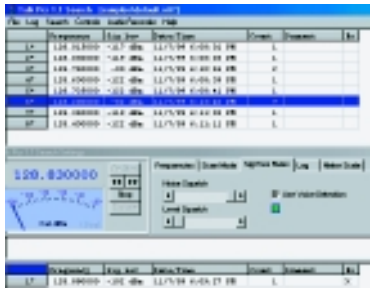
**By Chuck Kimball**



A bust of Admiral Byrd looks over McMurdo Station – the only US station with 24 hour, 365 days a year connection with the outside world. The author is a communications technician in a hostile environment in which radio contact can still mean the difference between life and death.



The **Radio Shack PRO-92** is a top quality, feature rich, multi-system trunking scanner, says Parnass (p.96). In addition to its low price, the alternative powered **Kaito KA-007** also sports the widest frequency coverage of all the emergency radios (p.95). **Sony's FRS U-ceiver** has a feature that Jock Elliott calls the slickest innovation he's seen in 10 years of writing about 2-way radios (p.94). If you own an Icom PCR1000 receiver, you owe it to yourself to purchase the inexpensive **TalkPCR** software by QROSoft (p.92). Also reviewed are **Stridsberg Engineering**'s FM Notch Filter and Antenna Multicoupler (p.98).



*MONITORING TIMES*
(ISSN: 0889-5341; Publishers Mail Agreement #1253492) is published monthly by Grove Enterprises, Inc., Brasstown, North Carolina, USA.



Address: P.O. Box 98, 7540 Highway 64 West, Brasstown, NC 28902-0098
Telephone: (828) 837-9200
Fax: (828) 837-2216 (24 hours)
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Editorial e-mail: *mteditor@grove-ent.com*
Subscriptions: *order@grove-ent.com*

Subscription Rates: $24.95 in US; $37.50 Canada; and $56.50 foreign elsewhere, US funds. Label indicates last issue of subscription. ***See page 107 for subscription information.***

Postmaster:
Send address changes to *Monitoring Times*, P.O. Box 98, Brasstown, NC 28902-0098.



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# LETTERS TO THE EDITOR

**NEWS AND VIEWS FROM OUR READERS** *Rachel Baughn, Editor*

## Monitoring Times in a New Century

Here at the turn of the millennium we find ourselves looking both to the future and to the past. To help scanner enthusiasts better manipulate the new frequency-sharing future of communications, we have added a trunking column, while we also look back at our past with the addition of a regular column on restoring old radios.

We've made some other adjustments at the start of this new year, so if you can't find a favorite column, it may simply have moved, or it may even have changed its name (*...and More* has become *Easy Access Radio*). We've added pages for helpful hints and a glossary (excerpts from our growing, on-line list of radio terms and acronyms), turned *The Fed Files* into a monthly column, and made room for periodic coverage of internet radio and DX programs. The *Satellite Radio Guide* will be alternating audio subcarrier schedules with SCPC services, with the added bonus of listing the transponder loading chart for one satellite per month.

Some of these column shifts have involved staff changes as well. We are very proud to announce the acquisition of Marc Ellis as the editor of the *Radio Restorations* column. Kevin Carey declared, "You can't do better than Marc Ellis! Congratulations!" Marc is editor of the Antique Wireless Association (AWA) publication, the *Old Timer's Bulletin,* and he wrote the antique radio column for Gernsback Publications (*Popular Electronics*) for 13 years, until the magazine was recently discontinued.

"I'd be delighted to get to know my new *Monitoring Times* readers better," says Marc in a message which didn't make it into his column on page 90, " so please let me know what you think of the plans for the column so far and pass along your ideas for the future. Though time will not usually permit personal answers, all mail will be acknowledged in the column. Requests for documentation and technical advice will be passed along to the readers at large. Snail mail: Marc Ellis, P.O. Box 1306, Evanston, IL 60201, or e-mail: *mfellis@enteract.com*."

We are also delighted to turn Dan Veeneman's talents from our discontinued *PCS Front Line* column to the new *Tracking the Trunks*. I think you'll agree when you read his first column (page 78) that Dan's talent for turning technology into plain English will make trunk following much less intimidating.

We also welcome a brand-new author, Gary Webbenhurst. When you read Gary's *Bright Ideas* (on page 33), you'll bang your head and say "Why didn't I think of that?!" His solutions may seem obvious and simple, especially to the seasoned listener. But why should the beginner have to learn it all the hard way?

We do have one column "vacancy" and that is the shortwave equipment review column, *Magne Tests*. Larry Magne has been writing shortwave receiver reviews for *Monitoring Times* since 1986, and it has been a long and happy association, but for one thing: because of our contractual agreement with Larry, *MT* could never accommodate the numerous reader requests for shortwave equipment reviews once the month was sold out. This issue has become even more critical now that we are planning an annual publication of *Monitoring Times* on CD-ROM; purchasers of the CD should not be missing one of the most important parts of each magazine.

We are tremendously grateful to Larry Magne for the support and loyalty he has shown to *Monitoring Times* and the *MT* Conventions. As editor, I have enjoyed his colorful writing (a legacy of his Texas upbringing, he says), and we value his continued friendship.

So that readers can continue to count on *MT* to provide objective, thorough information on receivers and equipment, Bob Grove will be lending his expertise as a reviewer until the right columnist can be found.

Where will the radio monitoring hobby go in the 21st Century? We certainly don't know, but with the help and support of our terrific readers and editorial staff, *Monitoring Times* plans to stick around to find out!

## Memories of Jean Shepherd

Several readers notified us of the passing of Jean Shepherd, K2ORS (see 12/99 "Communications"), but this broadcaster held a special significance to Thomas Lussen, who emailed this recollection.

"Jean was an active Radio Amateur most of his adult life, but he was best known for his radio talk show on New York's 50,000 watt (A2) clear channel WOR, 710 kHz, in the late 50s and 60s when AM was king.

"Jean worked alone, every week-night for 45 minutes, telling crazy stories about growing up in the midwest, being in the Army, or the mysteries of girls, cars, school and radio. And, the show was frequently "about radio." All aspects of radio, listening to AM-DX late at night, under the covers with the headphones on. Shortwave listening, building Knight Kits (remember Allied Radio in Chicago?), amateur radio, even building crystal sets and stringing wires out to the garage. Themes that many young people experienced while growing up. Stories about life.

"Listening to Jean's radio stories inspired me to get my ham license more than 30 years ago. I have been a ham ever since. How many of your readers grew up and developed an interest in radio listening to Jean Shepherd late at night, with the headphones on, under the covers? Jean Shepherd will be missed."

Bob Grove also noted that Jean Shepherd wrote and did the voice-overs for "A Christmas Story" – a touching movie which has now become standard television fare during the Christmas season.

## Whoizzit?

"In your September 1999 'Letters to the Editor,' Richard Ashley of Salt Lake City asked if anyone knew the purpose of an antenna site he recently discovered near Corrine, Utah.

"His description of the two log-periodic antennas and the omnidirectional antenna sounded vaguely familiar, since I have seen catalogs of commercial antennas of these types, which are used by the military and by commercial shortwave broadcasters. As the guy who handles reception and interference complaints for KSL-TV here in Salt Lake, I decided to see if I could solve this mystery, using some 'tricks' I have recently learned.

"Starting with a commercially available map program, I first did a search for Little Mountain in Utah. The first one I found was near the transmitter for KAZG-TV in Ogden, but this is not near Promontory Summit. The next Little Mountain I found *was* near the area he noted. The mapping program allows me to click on a spot and bring up a latitude/longitude map note for that spot.

"I have recently discovered a new database search facility on the FCC's website, under the Wireless Telecommunications Bureau. This site, at:

**http://www.fcc.gov/wtb** is a beta test for various license searches. The General Menu Reports-Table of Contents page, at **http://gullfoss.fcc.gov:8080/cgi-bin/ws.exe/beta/genmen/index.hts** allows the user to select various types of searches.

"I selected a latitude/longitude search (by service), then entered the approximate location (from my map), then asked for a search within a particular radius. This then brought up a list of the FCC databases which contained licensed sites within that area. By selecting each database, I was then able to see a list of licenses within each service. It is then possible to look up data concerning the frequency, the site, or the licensee. Under the FCC Coast and Ground Pending Database I found an FCC file number for a site near there, licensed as a Marine Coastal station. Site data showed its location, information on towers, name and address of the licensee, etc. Clicking to the frequency data, it showed 76 different frequencies licensed in the HF maritime bands.

"Contacting the licensee, an antenna manufacturer in California, I received some further information: The site was originally built as part of a government contract. When the contract ended, the manufacturer – rather than tear the site out – bid to buy it back from the government.

"It is now operated as a remote-controlled ionospheric sounder (or 'chirp sounder'). Using 10 watt and 100 watt transmitters, it sweeps from 2 to 30 MHz, characterizing the radio paths to other similar sites northeast and westnorthwest of itself (using the fixed log periodic directional antennas [LPDAs]) or in all directions (using the omni antenna). This radio path information is available to the manufacturer's customers, and the site itself is used to beta test upgrades on the chirp sounder equipment, which is used by regulatory agencies and commercial services worldwide.

"The 76 frequencies that are listed on the FCC website are probably the frequencies used in the original government program, since the chirp sounder equipment sends and receives in a single sweep of the HF band (if you were monitoring a specific frequency nearby, you might hear a short 'chirp,' hence the name).

"So, Richard was right, the site is in use. It isn't some secret 'spy station' though, it's just one of the many thousands of licensed transmitter sites that the FCC has to keep up with, and hopefully, now, Richard (and his fellow *MT* readers) know of one more resource for finding information on our hobby."

– Ken W. English, Sr. Engineer, KSL-TV, Salt Lake City

We thought it would be useful to readers to see the process Ken English used to answer this antenna puzzler. Pete Rowe of San Jose, California, also knew what the site was, but you could say he cheated . . .

Here's Pete's information: "I helped build that site in 1973. At that time, it belonged to Barry Research Corp in Palo Alto, CA. It was built to be a remotely controlled HF ionospheric sounding station. Barry Research pioneered the development of the FM-CW chirpsounder. Many of these chirpsounders are on the air today and are the familiar swept tone that chirps through the HF band. The Corrine, Utah, transmitter site is still in use, is maintained by BR Communications, and is on property leased from the Bureau of Land Management. I hope this clears up the mystery."

***Continued on page 105***

FPO -- Computer Aided Technology

## Disclosure case against McDermott reinstated

In 1996, John and Alice Martin intercepted a conversation between Congressman John Boehner (R-Ohio) and other House Republicans, including then House Speaker Newt Gingrich. The Martins later delivered a tape of the conversation to Congressman Jim McDermott (D-Wash.), who was then the ranking Democrat on the House Ethics Committee.

McDermott in turn provided copies to *The New York Times, The Atlanta-Journal Constitution*, and *Roll Call*, all three of which ran stories about the conversation. Boehner subsequently sued McDermott under provisions of the federal wiretap law, which prohibits the interception and disclosure of private telephone conversations.

The federal District Court in Washington, D.C., initially dismissed Boehner's claim against McDermott for civil damages, concluding that McDermott's receipt of the tape recording did not violate wiretapping laws, which prohibit only interception and disclosure, and that disclosure of the tape to the news media also was protected by the First Amendment.

However, a three-judge panel of the U.S. Court of Appeals in Washington, D.C. has now reversed the district court's dismissal of the claim and sent the case back for trial, holding that federal wiretap laws do not violate First Amendment principles of free press and free speech as applied in this case.

The court explained that by accepting an illegally intercepted tape of a telephone conversation between Boehner and other House Republicans, McDermott voluntarily assumed a "duty, if not of 'confidentiality,' then of nondisclosure. The duty stemmed of course from every citizen's responsibility to obey the law, of which [the federal wiretap law] is a part."

## Louisiana newspapers must face lawsuit

The Supreme Court refused to spare two Louisiana newspapers (the Alexandria *Daily Town Talk* and the weekly *Avoyelles Journal*) from having to defend themselves against a lawsuit for publishing details of an illegally recorded telephone conversation after the tape was played at a news conference.

The court, which has not handled a free press case since 1991, rejected without comment an appeal that argued the Constitution's First Amendment protection of press freedom shields the newspapers from Louisiana's wiretapping law because they did not make the illegal recording.

The court action sets no legal precedent, and does not preclude the possibility the justices might agree to review the Louisiana dispute should it ever return to them.

## Study to evaluate dangers

Give a round of applause for the Center for the Study of Wireless Electromagnetic Compatibility. The Center, based at the University of Oklahoma, plans to scientifically investigate whether cell phone use at gasoline stations and aboard airliners poses any dangers.

Some gasoline retailers have banned cellular telephone use, despite a lack of confirmed reports that cell phone use has caused fires or explosions.

Center Director Hank Grant also says the aircraft study will include tests with both current and future navigational systems. "By providing information based on fact, we will address these issues in a way that benefits everyone," Grant said.

In an era when even Delta has redefined its allowance of scanner use in flight (see this month's "Scanning Report"), maybe the study could impact the use of these and other devices on board as well. See their website at **http://www.ou.edu/engineering/emc**.

## Compelling argument for location technology

A woman whose car went off a highway entry ramp in the Kansas City area died when searchers were unable to find her car. Dana Jones called 911 using her cellphone, but she didn't know where she was; the dispatchers kept her on the phone for nearly two hours. The call came through a tower in the Kansas City, Kansas, area and the search was concentrated in that area, though the accident site turned out to be ten miles away. She was found by a passing truck driver.

Several systems are being developed to pinpoint the location of 911 callers. A GPS chip in the phone is another solution (see "Washington Whispers"). The Kansas legislature is considering a tax on cell phone calls to help pay for such equipment.

## Ol' Sol more dangerous than Y2k

As we enter the most active phase of solar cycle 23, the National Oceanic and Atmospheric Administration has devised a solar warning system to help protect our increasingly vulnerable society. Past solar storms have caused major blackouts and knocked out satellites, but such effects can be minimized if enough warning is given.

## BULLETIN BOARD

**(See www.grove-ent.com/hmpgmt.html for more events and club info)**

**Jan 1: Grimeton, Sweden**
Special VLF Transmission from SAQ (which closed in 1995): 1200-1300 UTC, on 17.2 kHz CW. QSL cards will be issued. Listener reports will be received via the mail, Internet, and amateur radio. Instructions will be included in the SAQ transmission and will be available after December 1, 1999, on the Web at **http://www.telemuseum.se/grimeton**.

**Jan 8: Loveland, CO**
Northern CO ARC Superfest at Larimer Co Fairgrounds, 700 Railroad Ave, 9am-3pm; talk-in 145.115 (-100Hz) or 146.52. VE testing, exhibits, computer, more. For more info see **www.info2000.net/~ncarc** or contact Michael Robinson N7MR *michael@frii.com* or 970-225-7501.

**Jan 15: St. Joseph, MO**
Northwest Missouri Winter Hamfest sponsored by MO Valley ARC and Ray-Clay ARC. Ramada Inn at I-29 and Frederick Ave; talk-in 146.85 and 444.925. 8a.m.-3p.m., adm. $3 or $5 for two. FCC exams, indoor flea market and exhibitors, free parking. Contact Dick Merrill KC0AMY, PO Box 1533, St. Joseph, MO 64502, 816-279-2304.

**Club News:**

**The American Shortwave Listener's Club (ASWLC)** is making a comeback. Here's the contact info: Stewart MacKenzie - WDX6AA, 16182 Ballad Lane, Huntington Beach, CA 92649, (714) 846-1685, *wdx6aa@earthlink.net*. **www.ocnow.com/community/groups/shortwaveradio**. Western USA, Pacific, Asia. SWBC, Utilities, LongWave, Clandestine, and BCB. Meets 1st Saturday of the month at 12noon address above.

**Southern California Area DXers (SCADS)** new contact: Bill Fisher Sr, 6398 Pheasant Drive, Buena Park, CA 90620, (714) 522-6434: *billfisher@dgx.net* or **scads.dgx.net/index.html**. AM-FM-TV-BCB-SWL-Scanners. Meets 3rd Saturday of the month in Seal Beach, CA

Two orbiting satellites, operated by NOAA, NASA and the Air Force, are now able to provide at least an hour's warning. In most danger of such hazardous energy bursts are our power grids, satellite systems and spacewalking astronauts.

One hour is enough time for power companies to protect their electrical grids. Satellite operators can protect orbiting equipment by turning off circuits, closing solar panels, or by turning away from the wave of energy. Spacewalking astronauts would have time to return to the safety of the shuttle or the space station.

NOAA has also created a new scale to precisely describe the intensity of solar storms. The scales will predict the intensity of three types of energy eruptions from the sun: geomagnetic, radiation and radio storms.

With 5 being the most severe, a geomagnetic storm rated G5 predicts electromagnetic energy powerful enough to knock out power grids, disable satellites and cause auroras to be visible as far south as the equator.

An S5 radiation storm would be powerful enough to kill spacewalking astronauts, disrupt communications, cause memory losses in satellites and even disrupt navigation signals. An R5 radio storm could cause a blackout of high frequency radio signals on the sunlit side of the Earth and disrupt low frequency navigation signals for hours.

So now, when the airways sound completely dead (see "Utility World"), check in to *MT*'s home page for a link to the current status report. It could be Ole Sol is just acting up.

## Navigation by buoy

Hobbyists may soon have a new navigational aid to DX – but, though mounted on a buoy, it's not intended to guide ships, but planes.

Aviation enthusiasts are familiar with the difficulties of air traffic control over the Atlantic and Pacific Ocean, but an area of increasing concern is the Gulf of Mexico. Business is booming between North and South America, but aircraft flying between the United States and Central and South America routinely lose radio contact with control towers after traveling about 170 miles from shore, depending on altitude and atmospheric conditions. Currently, changes in flight plans are often relayed through other planes.

A new system is being proposed consisting of three large buoys along a line 200 miles west of Fort Myers, Florida, to 200 miles east of Brownsville. The buoys will receive radio signals from aircraft and transmit them by satellite to the FAA Air Route Traffic Control Center in Houston. The prototype now being tested has enabled contact with more than 60 aircraft at ranges up to 260 miles.

The system could be in place and operational within two years, although a number of major decisions remain, such as who will build and maintain the system.

Plans also include the collection and transmission of environmental data on temperature, wind and sea conditions for the National Weather Service.

## Are you a "registered" ham?

Amateurs must be registered in the new Universal Licensing System in order to file applications with the FCC – including renewals, modifications, and vanity call sign requests. As of November, about 682,212 amateurs have yet to register.

To enter your registration, visit **http://www.fcc.gov/wtb/uls** and click on "TIN/Call Sign Registration." Paper registration also is possible. For more information, call toll-free 888-CALL FCC (225-5322).

## History or eyesore?

The debate on whether to preserve or remove three 300-foot tall radio towers at the US Naval Academy in Annapolis, Maryland, is over: They were toppled on Nov 13th. The US Naval Radio Station towers on Chesapeake Bay's Greenbury Point dated back to 1918 and some wanted to preserve them as an historic site.

The demolition was the first of three planned for 13 of the Navy's 16 towers at the site of the former Naval Radio Station. An 800-foot tower, two smaller towers, six 600-foot towers, and one 1200-foot tower are all scheduled to be dropped before December 5. Three small towers will remain standing, at least for now. Naval Academy officials have said they will preserve the point as a nature and hiking refuge.

## RNZI loses sports contract

Radio New Zealand International's sports coverage contract with domestic commercial broadcaster Radio Sport ended on Nov. 17. Listeners wishing to comment may e-mail Radio Sport at <*RadioSport@hotmail.com*>. RNZI has attempted to secure a sponsor in order to continue its sports service to the South Pacific but has so far been unsuccessful. Radio Sport had extended its deadline by two weeks, but has now terminated its feed to RNZI.

RNZI estimates the cost of continuing the service at $35,000NZ ($18,000US) per annum. – John Figliozzi

**Communications is compiled by Rachel Baughn** (mteditor@groveent.com) from news clippings sent in or emailed by our readers. Thanks to this month's contributors: Anonymous, Ballston Spa, NY; Chanel Cordell, Blairsville, GA; Peter Craig, Reno, NV; Roger Cravens, Atlanta, GA; John Figliozzi, Clifton Park, NY; Wayne Glenn, Cypress, CA; William Hochstatter, Colfax, WA; Kenny Love, Cola, SC; Jim MacDonald, Derry, NH; Bob Mills, San Diego, CA; Doug Robertson, Oxnard, CA; Ed Schwartz, Chicago, IL; Hardip Singh, Turlock, CA; Robert Thomas, Bridgeport, CT; Larry Van Horn, Brasstown, NC; Robert Wyman, Florida; ARRL Report

# American FM Radio in the New Millennium

## WCPE-FM, North Carolina's home of Great Classical Music, shows how it's done.

By Ken Reitz

Here, at the dawn of the new century and on the threshhold of a new millennium, radio broadcasting is at a technological crossroads. No longer confined to the limitations of radio frequencies (RF) radiating from a tower at a given locale, today's broadcasters are finding new ways to reach listeners. WCPE-FM, Wake Forest, NC, is a prime example of a broadcaster seizing every available means of transmission to further its mission. In the case of WCPE the mission is to "make great classical music available to the public 24 hours a day." And, this station delivers on its promise.

Broadcasting to most of central North Carolina and southern Virginia via its 100,000 watt transmitter feeding a state-of-the-art FM antenna atop a 1,200 foot tower, WCPE-FM serves its immediate listening area well. Most stations would consider that a happy ending to their technological achievement, but for WCPE it's just the beginning.

The driving force behind this station's hi-tech quest is Deborah Proctor, General Manager and station founder. Proctor, a graduate of nearby North Carolina State University, received her degree in Electrical Engineering in 1973. A year later she applied for a license to launch WCPE and received FCC approval in 1975.

As every broadcaster knows, getting the license is only half the fun; finding the funding to actually hit the airwaves is another matter entirely. It took another four years to line up the rest of what it takes to get a station on the air; building the studios, getting the equipment, setting up an antenna and organizing a staff. Finally, on July 16, 1978, WCPE-FM went on the air with a respectable 12.5 kW. The timing was right, the location was right and listeners responded enthusiastically to the music by reaching for their check books and wallets during each of their pledge drives.

Again, most public broadcasting stations would have been satisfied with the *status quo,* but remember, WCPE is on a mission and there's always room for new listeners. To help recruit new listeners and keep all their regular listeners informed, WCPE also publishes a bi-monthly 40 page program guide, which is sent to any listener contributing $35 or more to the station annually. Even this is negotiable. Ms Proctor says they routinely make adjustments to people on fixed incomes or otherwise not able to contribute $35. The guide is filled with well written pieces about the music and composers heard on the station as well as reviews of recently released classical CDS.

The station also publishes *Overture*, a 12 page, tabloid size, newsprint magazine now in its fourth year. *Overture* is published in conjunction with the North Carolina Symphony orchestra and distributed throughout the "Triangle" area of North Carolina through a division of the *Herald-Sun* newspaper of Durham, NC. This publication is free and serves to introduce everyone in the area to the work of the NCS and WCPE. Articles include upcoming concerts and events by the orchestra as well as WCPE station news and programming events.

Most public radio stations are either directly supported by a college or university or receive generous grants from state or federal budgets. WCPE clings stubbornly to its status as an independent radio station. They are not affiliated with any university and have no affiliation with or funding from the Corporation for Public Broadcasting. Nor do they receive any state or federal funding. The station conducts two major on-air fund drives during the year and receives grants from private foundations and businesses. This year the budget goal is $1.2 million.


***This 40 page 6 x 9" guide is published bi-monthly and sent to listeners who pledge $35 or more per year. It features a day to day program listing, articles about classical music, and photos and paintings of various composers. Reviews of recent CD releases are also presented.***

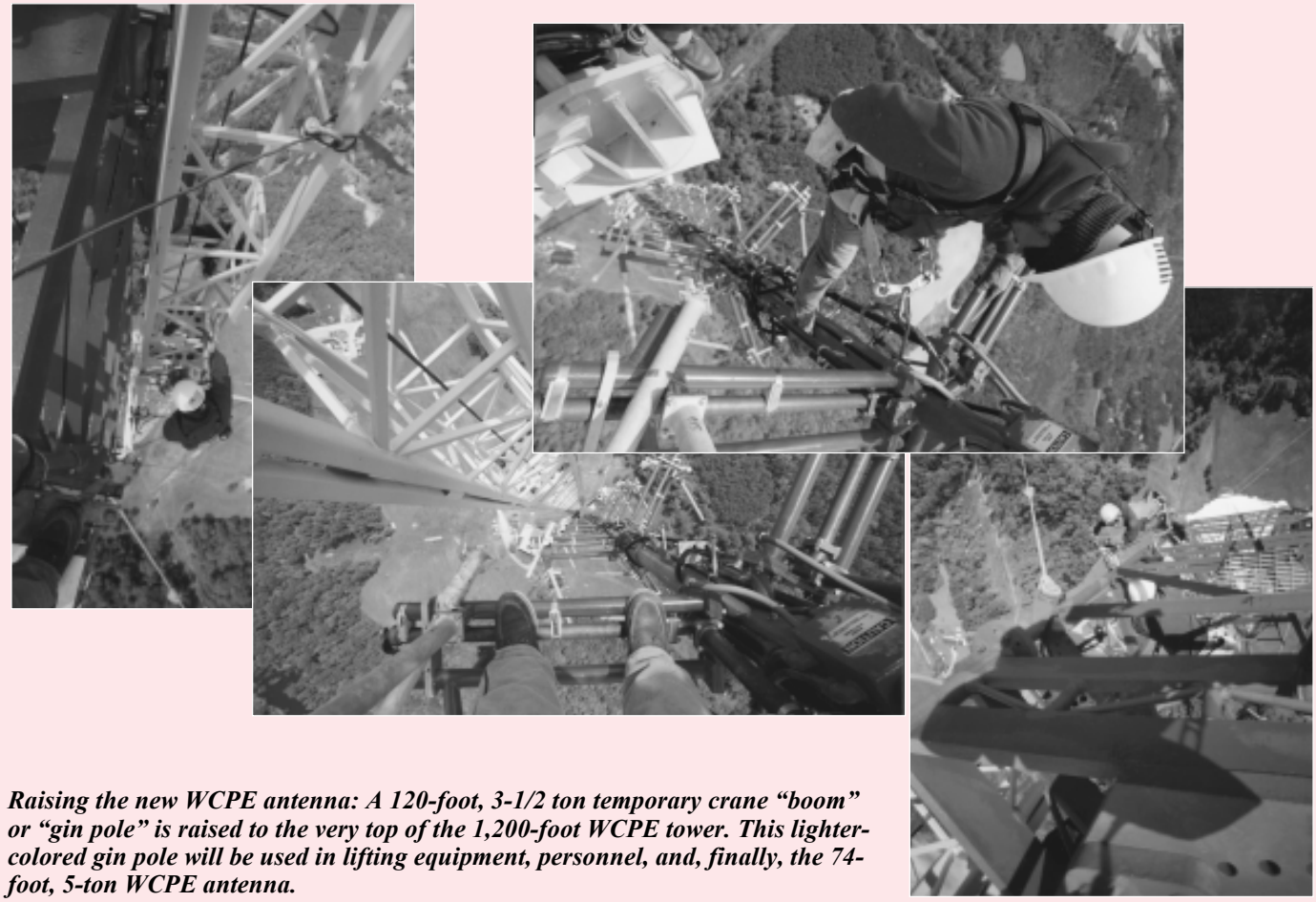
So, without the CPR and the international news presence of National Public Radio, how do WCPE listeners stay informed? That's easy, 10 times daily WCPE broadcasts international news live from the BBC World Service.

WCPE also takes the community service side of their FCC license seriously. In 1996 during Hurricane Fran, WCPE was the only public radio station in the eastern half of the state to remain on the air after commercial power failed. The $200,000 diesel-powered generator and 1,000 gallon fuel tank Deborah Proctor had installed at the site ran day and night. Says Ms Proctor, "We installed and tested the generator the day Fran was named a hurricane. A week later Fran was here, the power lines were in the mud and we ran 4 or 5 days constantly on our own generated power." The station broadcast information directly from the National Weather Service and served as an Emergency Broadcast relay station during the hurricane.

This past fall during Hurricane Floyd and the 500 year flood which ravaged the state, WCPE again remained on the air and provided weather service information. While escaping the serious flooding itself, the station manually left the grid and switched to auxiliary power hours before commercial power again failed. They remained on the generator until late the next day when power was restored.

***The staff of WCPE at their 20th anniversary open house. In the back row, the fifth person from the left is Deborah Proctor – General Manager, founder, engineer, and inspiration!***

*Inside the studios: Announcers Ann Martin and Mike Reddyhoff*



***Raising the new WCPE antenna: A 120-foot, 3-1/2 ton temporary crane "boom" or "gin pole" is raised to the very top of the 1,200-foot WCPE tower. This lighter-colored gin pole will be used in lifting equipment, personnel, and, finally, the 74-foot, 5-ton WCPE antenna.***

## The Sky's the Limit

WCPE's latest move in technology was to add its signal to the Galaxy 5 cable-TV satellite thus making its programming available to over 2 million home satellite viewers and every cable-TV system in the country (potentially available in more than 70 million homes).

Galaxy 5 is one of the prime cable-TV satellites used by America's cable systems to downlink programming. Transponder 7 (WGN-TV Chicago) is a channel considered a "basic" service in most programming packages and therefore available to every cable-TV system. Since WCPE's signal is not encrypted, the station encourages cable-TV systems to provide their commercial-free programming to system subscribers.

Incidently, the WCPE signal gets to the Galaxy 5 uplink via an MPEGII up/downlink on Spacenet 4 from their transmitter site. Digital parameters are listed in the side bar below.

It's too early to say what impact the station's signal on Galaxy 5 will have. It does make one thing clear: in addition to the station's mission to spread great classical music, it also has a mission to do so on whatever new technology comes along. That's why you'll also find WCPE broadcasting on the Internet via **www.broadcastmusic.com**, a service which started in the fall of 1998. And, if your computer is really up to the task, they provide an even better web-feed via a server courtesy of one of WCPE's inspired listeners.

This fact serves to point out the true distinction between WCPE and virtually all other public broadcasters: WCPE listeners aren't shy about donating. The fact is, WCPE-FM exudes prosperity. From its ultra-modern studios to its state-of-the art antenna, this is a broadcast facility which would be the pride of any metropolitan region in the U.S.

What's the magic formula for this station's storybook success? It's simple: a station manager driven by a mission and obsessed by cutting edge technology; a dedicated, professional staff; a well educated listenership with deep enough pockets to fund the mission; and 25 years of chasing a dream.

What's next for WCPE? This is a station which embraces technology, so it won't be a surprise to hear it next on CD Radio or XM Satellite, the two direct-to-car satellite radio services expected to launch later this hear. Once again WCPE-FM will be making "great classical music available to the public 24 hours a day" and showing the way for FM broadcasters into the future.

## CONTACT WCPE

For more information about WCPE-FM write them at Box 828 Wake Forest, NC 27588 or call 919-556-5178 or 800-556-5178; or visit their web site at **www.wcpe.org** where you'll find links to their two webcasts.

To listen via C-band satellite, tune to Galaxy 5 channel 7, 5.58/ 6.12 MHz narrowband. On 4DTV receivers the WCPE tuning code is G5,Ch-7,#958.

The programming is made available at no charge to cable-TV companies for re-transmission to cable subscribers and WCPE encourages potential listeners to ask their local cable systems to do so.

Digital reception via MPEGII receivers: Spacenet 4 (101 degrees W.) Freq: 3769.5 Horiz. Symbol rate: 192 kB, 48 kHz sample rate. FEC: ½.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# Ice Cold Radio

## Broadcasting and the Byrd Expeditions to Antarctica

**By Don Moore**

*When Christopher Columbus, James Cook, Lewis & Clark, and countless other explorers set off on their trips of discovery, no one back home knew where they were or what they were doing until they arrived back home. Many forgotten explorers set off and disappeared without a trace. But with the advent of radio, suddenly explorers could keep in day-to-day contact with civilization from even the most remote corner of the earth. And, where better to use radio than on the frozen ice fields of Antarctica.*

### THE FIRST BYRD EXPEDITION

In 1926, Richard Byrd became one of the most famous and popular figures in the USA after his flight over the North Pole. So, when he announced plans for an expedition to Antarctica to support a flight over the South Pole, it became the talk of the day and over a million dollars worth of money and supplies were donated to make the expedition a reality.

In September 1928 the expedition set sail for Antarctica, with a final stop in Dunedin, New Zealand, for last minute supplies. By mid-December they were in Antarctic waters, and on Christmas Day the men spotted their destination, the Ross Ice Shelf, during a Christmas party on the ship's deck while listening to a special Christmas program for them from KDKA on shortwave. Russell Owen, the *New York Times* reporter along to cover the expedition, wrote "It is weird and almost ghostly, to hear words from home coming to us as we move through these ice-filled waters to our base."

#### A MIXED BLESSING

When a good landing spot was found, Byrd set up a temporary camp on the ice field. With a bamboo pole to support a makeshift antenna, Byrd used radio to communicate with the nearby ship, the second ship still loading supplies back in New Zealand, and the search parties looking for a permanent base site.

A few days later Byrd wrote in his journal, "The radio beyond doubt has ended the isolation of this ice cap, its help is priceless. But I can see where it is going to destroy all peace of mind, which is half the attraction of the polar regions" (Carter).

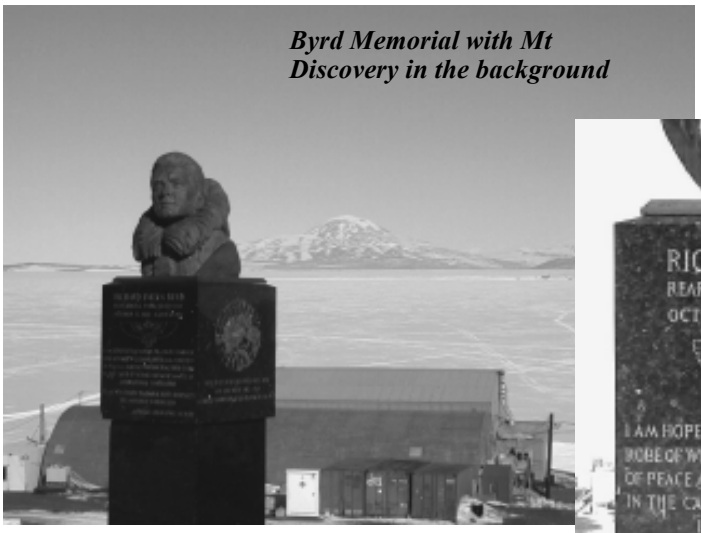
A sheltered spot a few miles away became the site for Little America, and soon the supplies and airplanes were unloaded, buildings constructed, and three 65 foot radio masts erected. Their holds empty, the ships left for New Zealand in late February, just ahead of the thickening ice. Left behind were 42 "Little Americans" who would spend the long polar winter on the ice cap.

Shortwave was the explorers' only link to civilization. Because not everyone had the time to listen, the radio operators copied down news reports and other interesting items to post in the mess hall. But how strange it was to read of events back home! As Russell Owen reflected, "It must be a tough place to live in, that world (with its floods and tornadoes and murders), not quiet and peaceful like ours. ... There was a faint memory of other places ... but we had lost all connection with that life, despite radio" (Carter).


***Admiral Byrd's radio from the 1928 expedition is preserved in Ralph Muchow's Historical Radio Museum in Elgin, Illinois. (Photographer: Henry Groskinsky)***

#### A NEW WAY OF LIFE

But there was one time each week when everyone gathered around the radio. Each Saturday at 11 p.m. EST (4 p.m. in Little America), stations WGY, Schenectady, and KDKA, Pittsburgh, beamed a special shortwave program to the expedition. There were brief speeches by public offi-



***Byrd Memorial with Mt Discovery in the background***

Photos taken for *Monitoring Times* by Chuck Kimball, McMurdo Base.

***The monument inscriptions***


cials and songs and skits by famous performers, but the important part was always the messages from family members back home. A network of AM stations in the USA also carried the program for whole country, and it became the highlight of weekend entertainment for many.

The expedition had no voice radio equipment, but the radio operators kept a regular schedule via Morse Code with New Zealand. They also made an amazing amount of DX contacts, including with other explorers in the Arctic, Greenland, and the jungles of Panama, and with the Graf Zeppelin, which was flying around the world. What really kept the radio busy, however, was Russel Owen, who keyed thousands of words in his daily dispatches to the *New York Times*. At the other end, often the first paragraph would already be typeset before he finished sending the story. Owen was later awarded a Pulitzer Prize for his work in Antarctica.

But beyond entertainment and news, radio really proved its worth when Byrd's plane ran out of gas due to a leak and had to land on the ice a hundred miles from Little America. Thanks to radio, what could have been a disaster became a minor inconvenience as the expedition's second plane came to the rescue with extra fuel.

Throughout the long year, the explorers made daily meteorological observations, collected samples of dozens of life forms, and launched dog-sled expeditions to explore the interior, increasing science's knowledge of Antarctica exponentially. But the main event was Byrd's planned flight to the South Pole and back.

The polar summer came and temperatures climbed above zero. The November 29th polar flight was probably the most dangerous ever made. Most of their route took them over glaciers and mountains that had never been seen before and they had no way of knowing if they might be boxed in and forced down or crash during a snow squall. To get enough altitude to skim over the last mountain range, they had to jettison most of the precious food and supplies they would need if they were forced down.

When they reached the Pole, they immediately radioed their success back to Little America. Alert monitors at the *New York Times* also heard the message, and immediately announced it to jubilant crowds in the streets outside. A few hours later the plane made it back to Little America after 18-1/2 hours in the air.

With all their goals accomplished, the explorers got ready for their ships to return and take them home. But via the radio they learned that sea ice was especially bad this year. Their ships couldn't get through and they might have to stay a second year. Finally, after 44 days of trying, one of their vessels made its way to the edge of the ice shelf by Little America. It was February 18, and they couldn't rely on more than a few days of open water. The explorers hurriedly packed up everything essential and loaded up in just twelve hours. The first expedition was over.

## THE SECOND EXPEDITION

The first Little America expedition had captivated the American people, and plans were immediately made for a return in 1932. But the nation was now in the depression, and corporate sponsorship was less easy to obtain. Nevertheless, money and equipment slowly flowed in. Among the sponsors was the Columbia Broadcasting System, which donated a generator, 1000 watt transmitter, and all the broadcasting equipment.

In the first expedition, broadcasts to Little America had entertained the explorers. Now, the roles would be switched, and the explorers would entertain the people back home. CBS announcer Charles Murphy was to accompany the expedition and produce, with the explorers' help, a weekly Saturday night radio program to be broadcast via shortwave and then relayed over CBS's flagship station WABC in New York City and over the CBS radio network. This was radio history in the making, and call letters and frequency assignments were even obtained from the FCC, although in reality the FCC had no jurisdiction over Antarctica.

Finally, in mid-October 1933 everything was ready, and the expedition started out from New York City in two vessels, the *Jack Rupert* and the *Bear of Oakland*. They made their way south through the Panama Canal, on to New Zealand, and then to the waters off Antarctica. The CBS network broadcasts were to begin soon, so on Thursday, January 4, 1934, the radio crew tried an experimental broadcast from the *Rupert's* 1000 watt transmitter (call KJTY) to CBS monitors in New York City, using the ship's whistle as an interval signal.

Reception was crystal clear until a main transformer burned out. The equipment was jury-rigged back on the air with 120 watts, yet reception in New York remained almost as good. As the *New York Times* heralded the next day, this broadcast of 120 watts over 8,500 miles set a new record for long-distance low-powered radio-telephony transmissions.

The first network broadcast originated in New York from the annual Explorers' Club banquet in the Astor Hotel on Saturday, January sixth. At 10:00 - 10:30 p.m., EST, CBS's monitors picked up KJTY from the *Jacob Rupert* and relayed it via radio to the nation and over speakers to the banquet.

But, reception was not as good as two days before, and only a few words from the various explorers could be made out. As one attendee put it, "I wouldn't have known (Byrd) from a penguin...still, it was an inspiration to at least listen to his ship's whistle."

The weekly broadcasts continued from the ship, but the poor results of the first broadcast had taught CBS a lesson. From now on, most of the messages and speeches for broadcast would be sent out via Morse code before the broadcast. Then if reception were poor, announcers in New York could read the explorers' words and the public wouldn't be totally disappointed.

### RETURN TO LITTLE AMERICA

A few days later, January 14, the *Jacob Rupert* anchored off the Ross Ice Shelf near Little America. A small party immediately set off for Little America, three miles away. Everything was under several feet of snow, except for the smokestacks, ventilators, and radio mast poking skyward. The explorers soon broke into their old buildings and found everything they had left behind, from dirty underwear to pots of four-year old leftovers, frozen solid. A fire was started and the leftovers were quickly gone.

But the ice had shifted since 1930, and this three-mile route would not be safe for hauling in 500 tons of supplies. Instead, they broke a 20-mile roundabout road through the ice and snow. Even with new gasoline-powered tractors to supplement the dog sleds, it was not easy going. The route was soon dubbed "misery trail." At one point a wide crevasse opened up in the ice along the route and it looked as if a new and longer path would have to be hacked out. But, the two 45-foot telephone poles for the new radio antenna were sledded in and put to temporary use as the base of a plankwood bridge.

For the first few weeks, the *Jacob Rupert* continued as the center of radio communication because Little America didn't have electricity yet. But a few days before the end of January the slower *Bear of Oakland* arrived with the electric generator. It was quickly unloaded and pulled over the ice to Little America by tractor, and on February 1, the 400 pound, 1000 watt CBS transmitter was unloaded from the Jacob Rupert and dog sledded to the camp. Chief Engineer John Dyer didn't wait around. That very afternoon he was on the air with a test broadcast to Buenos Aires and New York – the first voice broadcasts ever from Antarctica.

Two days later they were ready for the first regular Saturday night broadcast from Antarctica. Little America was still far from being put back together, and there has probably never been a worse set-up for a radio broadcast. The transmitter was in a tent on the snow surface where heavy winds blew open the flaps and drifted snow inside. The generator fared even less well – it was covered with drifts outside the tent. The men, at least, were inside – in the old mess hall, fifteen feet below and dimly lit by kerosene lanterns.

Byrd said later that he took one look at the set-up and thought "If (Dyer) could put on a broadcast under such conditions, he was a genius." "Think it will go through?" Byrd asked. "No reason why not if nothing blows up," Dyer replied (Byrd).

Dyer cued the first record, with the call KFZ repeated three times followed by barking sledge dogs, and then Murphy came on, "Hello, America. Byrd Expedition Calling ... You have just heard the call letters of station KFZ – Little America – inaugurating the first broadcast from the Antarctic continent." One by one the explorers went to the microphone to speak and this time the broadcast came through clearly in New York.

On February 26, the final supplies were unloaded, and the *Bear of Oakland* left for a winter berth in New Zealand, leaving behind 56 explorers. Except for a few comforts such as mattresses and electricity from the wind-driven generator, their life was very spartan. In the following CBS broadcast on March 3, Byrd noted "Little America is now, except for radio, cut off from civilization. In a few weeks the Ross Sea will be frozen. All civilization could no more reach us than it could reach the moon. For nearly a year we will be in another world where it gets far colder than the North Pole" (Carter).

### WORLD'S COLDEST RADIO PROGRAM?

The radio shack was one of several new buildings that made Little America almost seem like a village. As described in Byrd's journal,

RADIO SHACK 15x31x8 feet. (Built) by Waite, Bailey, Dyer, Hutcheson, and Lewisohn who shared it... It was the neatest, certainly the most comfortable building in Little America. The double walls were insulated with wool shearings, and a partition walling off the living quarters from the operations room in which the complicated radio apparatus was neatly arranged, made it comparatively very comfortable. One corner was set apart for the weekly General Foods Broadcasts over the Columbia Broadcasting System. It became a studio by the hurried acts of brushing the chessmen from the monitor board, advising Bailey to please pipe down on his snoring, plucking the reindeer hairs from the collapsible organ (the fur from the caribou

sleeping bags got into everything...) and carefully conveying from the vicinity of the microphone all coal bags, coal scuttles, pokers, stray pups, water buckets, etc over which the agitated performers were likely to stumble" (Byrd).

Charles Murphy organized and emceed the show from Little America, while Harry Von Zell anchored it in New York City and inserted commercials for General Foods. The entertainment was, well, eclectic. Head cook Al Carbone claimed he was the world's best harmonica player, and did his best to prove it. Seismologist E.C. Morgan organized a men's choir that named itself "Dr. Morgan's Knights of the Gray Underwear" and sung songs such as "Yes, Sir, That's My Baby," "Carry Me Back to Old Virginny," and "Auld Lang Sang." Others did imitations or told stories, and the meteorologist gave a weekly weather report.

Other times there were excerpts from the "Antarctic University" classes in which expedition members taught each other about trail operation, radio, navigation, and other specialties. Messages to family were another important part of the broadcasts, such as when aerial cameraman Joseph Peltier, who had been operated on for appendicitis a few days earlier, told his wife "Hello, Grace. Everything is fine. Don't worry; I am all right."

In order to give listeners a feeling of reality from the broadcasts, sometimes important meetings were reenacted as if they were actually taking place that very moment. For example, the February 17 program had mentioned that a huge section of the ice shelf, including Little America, was starting to break off and they might need to move the camp. The March 10 program included a meeting in which the expedition leaders voted on whether or not to move due to the threatening cracks. In reality, the ice had already solidified and the meeting had been held on March 3.

But, not all use of radio was for fun. Each tractor and sled was equipped with a specially built 1 watt transceiver housed in 5 inch square aluminum boxes with ear pieces, airplane microphones, and dry buttons for communication back to the main base. Every exploration party maintained a fixed schedule of contacts to the main base, and at two scheduled times a day, the main base listened for emergency broadcasts.

### ALONE

No one expected the second expedition could top the drama and daring of the South Pole flight, but Byrd had a plan to do so. This time he would spend the long Antarctic winter alone in a weather station over 100 miles from Little America. In late March, a tractor party hauled the prefabricated building and supplies to the chosen site. Once everything was set up, Byrd bid the men goodbye and became the world's southernmost inhabitant. His only contact with the outside world was a small generator-powered CW transceiver.

Before leaving, he had pointed out that he didn't know much about radio and that if his set failed and wasn't heard that they shouldn't be concerned. But everyone knew that the most likely cause of a communications breakdown would be an accident to him. Byrd was really telling them not to launch a rescue party, which would be suicidal.

Making radio contact was no easy job. Two hours before going on the air, Byrd had to drag the generator from the storage tunnel under the snow to his stove to warm up. Once it was thawed and fueled, it had to be dragged back to the tunnel to keep out the fumes. Finally ready, he rope-cranked it on and ran back inside to turn on the radio. At 10 a.m. promptly, Dyer would be on 100 meters speaking "KFZ calling KFY." Byrd responded in code. At the end of the first QSO, Dyer told Byrd that his CW rated about a D-. After that, he began writing out the dots and dashes on paper beforehand.

Except for the biweekly radio contact, life at the weather station was a routine of checking the instruments, reading, writing, eating, and sleeping. But that all changed at the end of May when Byrd passed out from carbon-monoxide poisoning caused by a leak in his stove. Without a means of fixing the leak, Byrd had to use the stove sporadically, balancing the need to breath good air and the need to avoid freezing to death. He hid his problem from the men back at base, a task made easier with his CW radio. With voice communications, his tone surely would have given away his ever-worsening condition.

On July 5 the generator broke down and he had to begin using a hand cranked emergency transmitter for the biweekly radio contact, which further weakened him. By this point, Little America was starting to realize that something was wrong. On August 8, he finally asked for help. "Bill, get them here fast," he keyed to Dyer. An expedition left almost immediately and amazingly made it in two days. When the story was told on the next weekly radio show, it was probably the most dramatic of the CBS series. But brave as he was to hold out for so long under such conditions, many couldn't help but ask why he did such a foolish thing in the first place as trying to live alone in Antarctica.

Much of the expedition's routine but important scientific work remained to be done, but after Byrd's rescue, everything else was anticlimactic, even for the radio audience back home. Soon January came and this time the sea was ice free. The ships came, the expedition packed up, and Antarctica's first experience as a radio studio was over.

MT

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# Antarctic Communications Today

By Chuck Kimball

HF (3 to 30 MHz) is the mainstay of Antarctic communications for the United States Antarctic Program (USAP). Up until this current summer season (October '99 through February 2000), HF was the only communication with most deep field camps and scientific parties. Starting this season, approximately 25 Iridium phones are being used in the deep field camps, and stations in the program. Concerns over costs and other limitations will keep HF the primary mode for many years to come.

McMurdo Station is the largest of the USAP installations on the continent. A summer population can reach 1,200 people in "Mac Town," with another 220 at the South Pole (due to the station construction project), and about 50 at Palmer Station. These three are the permanent year-round facilities. During the summer season many deep field camps area put in for various science projects and support functions.

McMurdo Station is the only U.S. station with a 24 hour/365 day a year connection to the outside world. An 11-meter ground earth station (located at Black Island) is used to communicate with a commercial satellite (Intelsat at 177 degrees West) for full time access to the States. This system provides a T-1 Circuit for telephone, and data. It also allows the reception of three channels of television via Armed Forces Radio and Television.

McMurdo is the hub for most of the activities on the continent (other than Palmer Station). It has an air traffic control center, weather forecast office, and many other offices to handle the logistics and support of the field crews.

Numerous facilitates have been built over the years to support the HF radio needs at McMurdo Station.

## T-Site

A transmitter site (T-Site) is located in McMurdo, a few hundred feet in elevation above and about a half mile from town on the side of Crater Hill. Ten very old Harris transmitters were previously operated at 10 kilowatts (kW) of power; currently none are capable of more than 3 kW, and all are usually operating at 1 kW or below. An operator is on duty 24 hours a day to make adjustments, and keep the equipment running. This system is scheduled for replacement in the next few years, and will run unattended.

A large antenna field contains numerous rhombic, conical monopoles, and cut length dipoles, oriented in different directions (South Pole; Christchurch, New Zealand, etc.). The site also houses many of the VHF FM base stations used in running the town, and AM aircraft equipment (both VHF and UHF military bands) for air traffic control. Several other buildings dot Crater Hill with repeaters and equipment for both the U.S. programs and the New Zealand program.

## Receive Sites

Arrival Heights and Black Island provide two HF Receive sites. Arrival Heights is located approximately 3/4 mile from T-Site, also above town. A roset and the dipole antennas are fed back to "Mac Relay," the hub of HF communications in McMurdo. There are 10 runs of 7/8-inch hardline about 7,000 feet long to feed the receivers. NASA also maintains a tracking station on Arrival Heights, with the data relayed out to their own Tracking and Data Relay Satellite Station (TDRSS) at Black Island.

Black Island is located about 25 miles

Photo by Chuck Kimball

***Overview of McMurdo Station. The dome in the background is NASA's McMurdo Ground Station. The large white building in the center is the Crary Science Lab. The yellow building to the left of it with the domes, is 165, the field operations center (Mac Ops), communications center (Mac Relay), Air Traffic Control (Mac Center), Weather Office (Mac Weather), and NY Air National Guard offices (Raven Ops).***

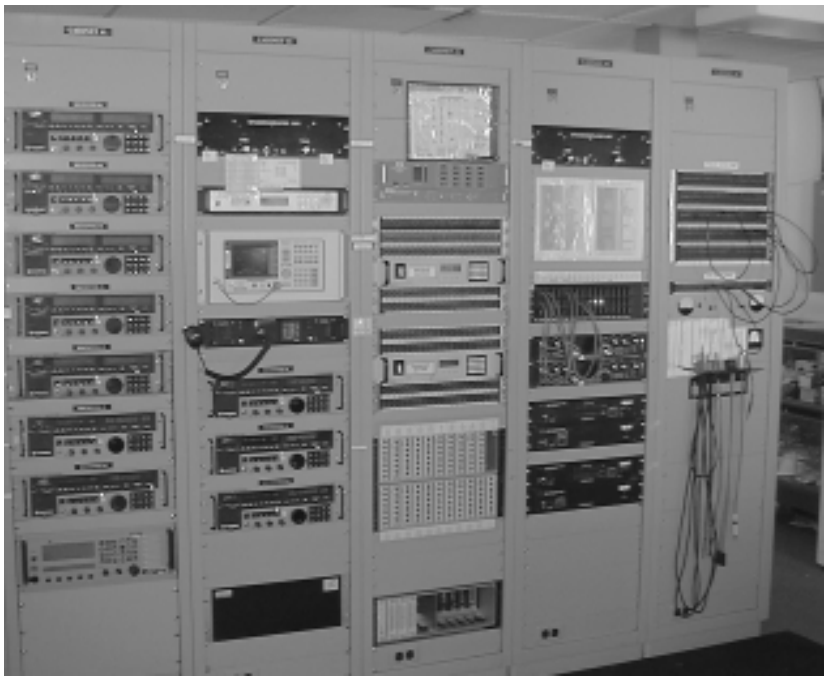


Photo by Chuck Kimball

***Local receivers and audio distribution in Mac relay. The HP spectrum analyzer in the middle of the rack is used to monitor the transmitters.***

across McMurdo Sound from town. It houses an HF receive site, the 11 meter satellite ground station, a 7 meter NASA TDRSS ground station, a 2 GHz microwave back to McMurdo, three 900 MHz links for the three TV Channels, and a large HF antenna field.

It is primarily solar and wind powered, with diesel generator backup. Winds are common at 67-80 mph, and the maximum sustained winds have been recorded at 125 mph, with top gusts of 165 mph.

## Satellite

McMurdo is about as far south (about 78 deg. South), as you can go and still see satellites in a geosynchronous orbit. The Black Island earth station normally operates with an elevation look of only 3.16 deg. above the horizon.

The South Pole relies heavily on a NASA TDRSS satellite, which provides about 4 hours a day of T-1 bandwidth. They also use the NOAA GOES-3, which no longer provides any imaging or weather data, but does still has a working transponder. All of the satellites used by the pole are no longer used for their primary purpose, so they are allowed to drift in their orbital slot. As they drift south of the equator, they can be seen from the pole. GOES-3 can be seen from the pole for approximately 6 hours each day and is used to provide a 256 kbps data connection. The GOES-3 satellite is also used from Palmer Station and, during the 98-99 and 99-00 summer seasons, from a deep field camp.

The Department of Defense Lincoln Experimental Satellite (LES-9) is also used at the pole to provide approximately 6-1/2 hours a day of data connection at 56 kbps.

Also still in limited use is NASA's Applications Technology Satellite (ATS-3). Although not used much for data, it still provides a voice link to the States, and a simple phone patch is available for about 7 hours per day. In the 98-99 summer season it was used at Siple Dome (a deep field camp) for both voice and data, but this past season, it was only used at the Pole and at Palmer Station. The through put data rate on ATS-3 is less than 300 bps (note the absence of a K!)

## Field Radios

The standard issue HF radio is a PRC-1099. Designed for military use, it holds up well in the Antarctic environment. A radio shop built dipole antenna is issued with each radio and uses several jumpers to adjust it to the correct length for the operating frequency. The USAP owns approximately 150 of the 1099's for field use.

Each field camp and science party traveling away from camp is issued at least two HF radios. When someone is dropped off in the field they must set up an HF radio, contact "Mac Ops" (the operations center), have a tent set up and a stove lit, before the plane or helicopter can leave them. The second radio is a backup.

Field parties can be left hundreds of miles from the nearest other human, and communications are required for their safety. If a daily check-in is missed, a search and rescue mission may be initiated for them. On a continent of 5.4 million square miles and only a few thousand people, it can be a lonely place. (There also restrictions against traveling alone).

Each radio is issued with a spare battery and a portable solar panel. During the summer science season, there is daylight 24 hours a day to charge the batteries (depending on cloud cover).

Many field teams and camps also make use VHF equipment for communicating between team members.

## INTERNET RESOURCES FOR FURTHER READING:

NSF/USAP - United States Antarctic Program
http://www.nsf.gov/od/opp/

ASA - Antarctic Support Associates
http://www.asa.org

ATS - Aviation Technical Services (Provides Weather, ATC)
http://ats.spawar.navy.mil/

PHI - Petroleum Helicopters Inc.
http://www.phihelico.com/

NY Air National Guard (LC-130)
http://www.dmna.state.ny.us/ang/109.html

USCG - Icebreaker Operations
http://www.uscg.mil/pacarea/iceops/homeice.htm

GOES-3 Satellite
http://www.earth.nasa.gov/history/goes/goes3.html

TDRSS Satellite
http://spacelink.msfc.nasa.gov/Instructional.Materials/Curriculum.Support/Space.Science/Satellites/Tracking.and.Data.Relay.Satellite.TDRSS/.index.html

ATS-3 Satellite
http://atscc.lerc.nasa.gov/

LES-9 Satellite
http://www.tbs-satellite.com/tse/online/sat_les_9.html

Malibar, FL Satellite Ground Station
http://www.rsmas.miami.edu/groups/malabar.html

Authors web page
http://www.rof.net/wp/kimball/index.htm

## FREQUENCIES

**Primary USAP Antarctic HF Frequencies, McMurdo & South Pole Stations**

All are USB unless noted otherwise.

| | |
|---|---|
| 4067.0 kHz | Palmer Station |
| 4240.0 kHz | Ship operations |
| 4553.0 kHz | Palmer Station |
| 4718.0 kHz | Air Traffic Control - Helicopters |
| 4770.0 kHz | USAP Field Parties |
| 5100.0 kHz | Air to Ground (Rarely used) |
| 5400.0 kHz | New Zealand Field Parties |
| 5727.5 kHz | Air Traffic Control |
| 7338.0 kHz | USAP RTTY (South Pole to/from McMurdo) |
| 7995.0 kHz | USAP Field Parties |
| 8090.0 kHz | Antarctic Broadcast |
| 8418.0 kHz | Backup Ship Operations |
| 9032.0 kHz | Air Traffic Control |
| 9115.0 kHz | Palmer Station |
| 10639.0 kHz | Weather |
| 11256.0 kHz | Air Traffic Control |
| 11553.0 kHz | Outlying Camp (Mostly South Pole Traffic) |
| 12220.0 kHz | Weather |

**HF Radio Users**

MAC Relay
Provides phone patches, and relay to other offices, and coordinates frequency use and circuits.
MAC Ops
Field Operations Center, keeps status on all US Field Parties.
MAC Center
McMurdo Air Traffic Control Center
MAC Weather
McMurdo Weather Office
Siple Dome
Deep Field Camp
Byrd Surface Camp
Deep Field Camp should be active next few years
South Pole
U.S. Amundsen - Scott South Pole Station

Numbers are used to designate science groups (It is based on their project number and may have a letter in front of it) i.e.: 153, or G-153 is a research project working in the west Antarctic ice shelf.

**VHF/UHF Air Traffic Frequencies**

| | |
|---|---|
| 118.50 MHz | ATC - Mac Center |
| 126.20 MHz | Tower Operations (both Willy & Ice Runways) |
| 123.45 MHz | LC-130 Operations |
| 270.60 MHz | ATC - Mac Center |
| 340.20 MHz | Tower Operations (both Willy & Ice Runways) |
| 143.000 MHz Simplex | McMurdo Industrial Net |
| 139.600 MHz Simplex | Crash Net (Fire Department) |
| 142.600 MHz Repeater | Public Works Net |
| 139.200 MHz Simplex | Tower Operations |
| 139.500 MHz Simplex | Science Net |
| 143.225 MHz Repeaters | Field Party Repeaters |
| 143.600 MHz Simplex | Fuels Net |
| 143.725 MHz Repeater | Antarctic Terminal Ops |
| 143.400 MHz Simplex | Helo Ops |
| 143.975 MHz Repeaters | Helo Flight Following |
| 143.200 MHz Simplex | NY ANG Operations |
| 139.400 MHz Simplex | NY ANG Operations |
| 138.400 MHz Simplex | Electrical Linemen |
| 147.800 MHz Simplex | Paging System (yes a ham frequency) |
| 156.650 MHz Simplex | Marine Ch. 13 Port Control |
| 156.700 MHz Simplex | Marine Ch. 14 Port Control |
| 156.800 MHz Simplex | Marine Ch. 16 Calling/ Distress |
| 157.050 MHz Simplex | Marine Ch. 21 USCG Icebreaker Ops |
| 157.100 MHz Simplex | Marine Ch.22 USCG Icebreaker Ops |
| 157.150 MHz Simplex | Marine Ch.23 USCG Icebreaker Ops |
| 156.575 MHz Simplex | Marine Ch.71 Kapitan Khlebnilkov (Russian Icebreaker/tour ship) |
| 157.175 MHz Simplex | Marine Ch.83 USCG Helicopter |
| 135.575 MHz | ATS-3 Voice Downlink |
| 135.545 MHz | ATS-3 Data Downlink |
| 135.665 MHz | ATS-3 Data Downlink |

**Other Antarctic Programs**

New Zealand

| | |
|---|---|
| 2773.0 kHz | Field Party HF |
| 5400.0 kHz | Field Party HF |
| 8010.0 kHz | Field Party HF |
| 11570.0 kHz | Field Party HF |

Great Britain

| | |
|---|---|
| 5080.0 kHz | LSB |
| 7755.0 kHz | USB |
| 11260.0 kHz | USB Aircraft |

France:

| | |
|---|---|
| 7420.0 kHz | ConCordia |
| 7450.0 kHz | Dumont D'vivile |

Others:

| | |
|---|---|
| 5371.0 kHz | Italian Program at Terra Nova Bay |
| 15026.0 kHz | Adventure Network International - Patriot Hills |
| 5600.0 kHz | Germany Gondwanaland |

A complete list of frequencies is updated at **http://www.geocities.com/scancsp/usap.htm**

## SATELLITE FREQUENCIES

Frequency info courtesy of Larry Van Horn.

**LES-8/9 Downlinks**

249.350 Wideband Channel 1
249.375 Wideband Channel 2
249.400 Wideband Channel 3
249.425 Wideband Channel 4
249.450 Wideband Channel 5
249.475 Wideband Channel 6
249.500 Wideband Channel 7
249.525 Wideband Channel 8
249.550 Wideband Channel 9
249.575 Wideband Channel 10
249.600 Wideband Channel 11
249.625 Wideband Channel 12
249.650 Wideband Channel 13
249.675 Wideband Channel 14
249.700 Wideband Channel 15
249.725 Wideband Channel 16
249.750 Wideband Channel 17
249.775 Wideband Channel 18
249.800 Wideband Channel 19
249.825 Wideband Channel 20
249.850 Wideband Channel 21

Recently reported **UHF military satellite** intercepts from Antarctica:

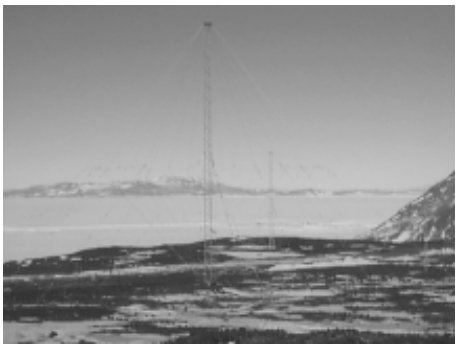
261.475 McMurdo-New Zealand Air Ops/Logistics
261.500 McMurdo-New Zealand Air Ops/Logistics
261.525 McMurdo-New Zealand Air Ops/Logistics
261.900 McMurdo-New Zealand Air Ops/Logistics
269.750 McMurdo-New Zealand Air Ops/Logistics

Recently reported **ATS-3** downlink intercepts
135.555 Palmer Station/South Pole, Antarctica Data
135.610 Palmer Station/South Pole, Antarctica Voice
135.640 Palmer Station/South Pole, Antarctica Voice

**GOES-3 S-band** downlink 1691.0 MHz.

Photos by Chuck Kimball

*View of the McMurdo HF Transmitter Site and a portion of the antenna field, with the frozen Ross Sea and Royal Society Range in the background.*



*Two of the Conical Monopoles in use at the McMurdo Transmitter Site.*

One portable GOES-3 satellite terminal is also available and used in a field camp each season to provide about 56 kbps of data for several hours a day.

## McMurdo Station Operations

In addition to providing most of the services needed for a small town (power, water, hospital, fire department, etc.), the station also operates the continent's busiest international airport. There are approximately 100 round trip flights from Christchurch New Zealand to McMurdo during the 4-1/2 month summer season. (There are no flights after the station closes in late February until the winter flight in late August, except in the case of a medical evacuation.) These are conducted by C-141, C-5, C-7, C-130, and LC-130 military aircraft. In addition there are approximately 400 intracontinental missions by LC-130 (ski-equipped Hercules). The three contract twin otters also fly numerous other missions.

Air traffic control is provided by both an ATC Center (Mac Center), and a local tower. During the course of the summer season three separate airfields are used. Early in the season a runway operates on the sea ice which allows wheeled aircraft (C-141, and C-130). Known as the ice runway, it has its own control tower ("Ice Tower"). Once the ice becomes too weak in early December (it melts each year), operations shift to the snow runway (known as a skiway) at Williams Field, and the tower operations are moved there (Willy Tower). At the end of the season (early February) a limited number of C-141 flights operate from the Pegasus permanent ice runway. Several HF/VHF/UHF aircraft frequencies are used in these operations.

Approximately 15 VHF frequencies are used in support of the town operations. The National Science Foundation has to provide most all of the support functions you would find in any town. All of these operations operate in the 138-150 MHz range. The navy provided the original support operations, and most of the frequencies in use are navy allocations. There is no law enforcement; most problems are dealt with by firing the employee and sending them home, although there is usually a National Science Foundation (NSF) employee on base who is a Special US Marshal in case of a serious crime.

In mid to late December the U.S. Coast Guard arrives in town. In alternate years the USCG ice breakers *Polar Sea*, and *Polar Star* share the responsibility of opening the sea channel into the station. They can be heard on VHF marine channels (13, 14, 16, 21A, 22A, 23A, 68, 71, 74, 81A, 82A, 83) and on HF. They also keep the sea channel open for the supply ships.

A fuel delivery in early January provides almost 6 million gallons of fuel necessary to operate the station. Late January the *MV Greenwave* arrives with about 11,000,000 pounds of supplies and equipment needed for the following year, and removes about 5,000,000 pounds of trash and retrograde materials. Several tourist ships also pass through the McMurdo Sound area each year and usually operate on both the VHF marine and HF frequencies. The contract research ships of the National Science Foundation also make port calls at McMurdo.

During the 1998-1999 summer season almost 2,000 hours of helicopter time was committed to science and support operations around McMurdo Station. NSF contracts four primary helicopters from Petroleum Helicopters Inc. (PHI). In addition, the New Zealand Air Force provides one or two UH-1s (Hueys) in support of the US program, and the Coast Guard's ice breakers helicopters also fly support when they are in the area.

The helicopter operations are conducted on the air traffic control AM frequencies, and a flight-following VHF FM repeater system is also put up on several mountains in the McMurdo area. On rare occasions they operate far enough from town that they use HF for communications with ATC.

## Other radio use

There are a whole host of other radios used throughout the USAP. The South Pole maintains the most active ham station (KC4AAA), and relies on it for phone patches home. Data for remote weather stations is moved on UHF

Photo by Chuck Kimball

*"Mac Ops" - Field Operations Center, monitors the field parties and camps, and all vehicle and foot travel in remote areas.*

frequencies. Differential global position satellite (DGPS) data, remote seismic data, balloon telemetry and many others use both VHF and UHF frequencies. A UHF radio telephone system is used for some camps located close to McMurdo Station.

There are several other stations scattered throughout Antarctica operated by many different countries, and all of them operate HF, VHF, and UHF equipment also. Even seals and penguins carry VHF transmitters, as they are tracked for research purposes

Even though it may be the driest, highest, windiest, most remote continent on the earth, it's not difficult to fill up your scanner.

*View of the Black Island Telecommunications Facility. The dome houses the 11-meter dish for the satellite to the U.S. Three of the four wind generators are visible, the roof of the buildings are covered with solar panels. The fuel tanks in the background are used for the backup generators. The microwave dishes connect the communications equipment here to McMurdo (about 20 miles away).*

**ABOUT THE AUTHOR:**

Chuck is currently finishing his second summer season in Antarctica as a Communications Technician. When not traveling he calls Glenwood Springs, Colorado, home.


# 1999 Index of Articles

## FEATURES:



## AMERICAN BANDSCAN



## ...AND MORE! (RENAMED EASY ACCESS RADIO)



## ANTENNA TOPICS



## BEGINNER'S CORNER



## BELOW 500 KHZ

OCT ..... Natural Radio - The Hardware
NOV ..... Did you know? IDs; call assignments; FAA beacons; splinter freqs; harmonics; homebrew natural radio
DEC ..... A Look Back (letter from ship radio officer)

## BOB'S TIP OF THE MONTH

JAN ..... Spool antenna for portable SWLing
FEB ..... Converting an AM/FM for aircraft/public safety reception
MAR ..... Hints by the Handful (24 hr time on 12hr watch; check Uniden for RS cost savings; custom cataloging MT articles; dust your radios)
APR ..... Synchronous detection and digital RF signal generator for the technically adept
MAY ..... Better reel antenna/Memory keep-alive while changing batteries
JUN ..... Roll your own NiCds
JUL ..... More on the fat vs. thin antenna wire; more on license-free wireless mike; more on Sony memory battery replacement
AUG ..... Two radios, one antenna; one radio, two antennas
SEP ..... Pocket organizers and PDAs; reducing circuit noise in used rcvrs; using your car stereo for scanner/sw sound
OCT ..... More Sony ICF-2010 audio Improvements (better audio, better bandwidth); circuit correction for August feature
NOV ..... More earphone audio on BC scanners
DEC ..... Fixing intermittent Sony 2010 battery operation

## CLOSING COMMENTS

JAN ..... The Millennium Dilemma: Myth or Monster?
FEB ..... Bits and Pieces (ridiculous regulation; Leonid meteor storm; hobby rebound)
MAR ..... Great Wailing and Gnashing of Teeth (The Right to Listen; A New Ham Test?)
APR ..... Radio Waves and the Human Body
MAY ..... The FCC on the Hot Seat
JUN ..... Scanner Listeners and the Law
JUL ..... The Frequencies, They are a'Changin'!
AUG ..... In Opposition to "Technospeak"
SEP ..... The Results are In - How Do You Measure Up?
OCT ..... Y2k - Myth or Monster? You decide.
NOV ..... Looking Back as We Move Forward
DEC ..... Greetings from the MT Staff!

## COMPUTERS & RADIO

JAN ..... A Reflection on Computers & Radar
FEB ..... 3.4 Million freqs (Grove FCC database) and the COMDEX Report
MAR ..... AirNav 2.10
APR ..... DXtreme Software's SWRLgold V3.0
MAY ..... Software radio prospects / SkySpy ACARS decoding program
JUN ..... Interfacing with the Icom IC-R2 (build or buy interface, R2 utility program)
JUL ..... Get the Picture with RadioCom 3.52
AUG ..... Seeing is Believing with VisualRadio
SEP ..... Flight Databases Plus v4.0 ACARS Add-on
OCT ..... AirNav 3 - NOT Just a Revision!
NOV ..... The Duality of Life on the Internet (purchases gone wrong)
DEC ..... The Better Side of the Internet (Jet Radio)

## DIGITAL DIGEST

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FEB ..... Who's on Where? Part 2
MAR ..... Twinplex - SITOR ARQ on the Double; new sequential duplex ARQ system?
APR ..... Catch Coquelet-8 before it's too late
MAY ..... Gearing up for complex decoding
JUN ..... Old systems going strong (Havana, Cairo embassies)
JUL ..... Computerized Monitoring Aids (NSK PC Freq Manager)
AUG ..... Robust Romania
SEP ..... Piccolo
OCT ..... Two's Company, Thirty Six is a CROWD; Chinese diplo moving to PSK
NOV ..... PSK - HF Digital's Brave New World
DEC ..... PSK - Part 2

## EXPERIMENTER'S WORKSHOP

JAN ..... Mastering the Grove FCC Database
FEB ..... Data Decoder Interface for Trunk Following
MAR ..... Soup up your Computer for Radio
APR ..... Dual Polarity Power Supplies
MAY ..... 4-Level FSK data decoder interface
JUN ..... Modifying the Sony WaveHawk - baseband audio, data decoding, S-meter, AM and WFM baseband taps, tape recording, backlight, extended memory
JUL ..... Computer Update: Trends & Features
AUG ..... Tools & Techniques (building and equipping the workbench)
SEP ..... Update on Computer Networking - II
OCT ..... Computer Tools, Utilities, and Tips for Radio
NOV ..... Electroluminescent Panels
DEC ..... The End of an Era

## THE FED FILES

FEB ..... Where have all the fed freqs gone? (Standard Federal Trunked land mobile systems); 163-163.9875 allocations
APR ..... Nat'l Disaster Medical Sys; more on 120.375 MHz; 164-164.9875 MHz allocations
JUN ..... Monitoring in W. Arkansas; DEA in San Diego; FF updates from readers; 165-165.9875 MHz allocations
AUG ..... US Fish and Wildlife Service; 166-166.9875 allocations
OCT ..... Fed Files mailbag: NC Feds, More FBI Freqs, US Fish and Wildlife update, Blue Ridge Pkwy; 167-167.9875 MHz allocations
DEC ..... Monitoring Y2k the Government Way (by-agency and by-freq listings)

## GLOBAL FORUM

JAN ..... Update on HCJB's Pifo Problem
FEB ..... "Anything Goes" Gone
MAR ..... France Snubs Western English Speakers
APR ..... Sunspot Peak; BBC Comes Clean about 3-year plan
MAY ..... Antarctica's Archangel on the Air
JUN ..... Find it on the web (IBB; SEC)
JUL ..... China Sneaks in Cuban Relay
AUG ..... Arne Skoog 1913-1999
SEP ..... Thanks to Cuba and China, Jamming Continues
OCT ..... Deutsche Welle Faces Radial Cutbacks; Don't Miss Radio St Helena Day
NOV ..... WBCQ Celebrates One Year
DEC ..... CIDX SW Listener Survey

## HOT NEWS

JAN ..... Program Changes in a new BCing Season (R Prague, R Vlaanderen, R Netherlands, WRN, Polish R Warsaw, R Australia, R Taipei Intl, BBC America, WRN-1
MAR ..... Radio Waves, VOA to Africa, views of earth from space on internet, Art Bell update
APR ..... BBC Singapore; DAB portable receivers; ODXA Milestone; EDXP electronic newsletter; Hard-Core DX emailing list; Mac using SWLs on the increase; WRN selected programming
MAY ..... DW Radio Worlds; Grove free stuff; WWCR DX block; ODXA Radio Fest; Internet radio; sunspot webpage; NOAA radio; selected programs
JUL ..... Kosovo Crisis
SEP ..... BBC World TV
OCT ..... Radio Republik Indonesia
NOV ..... SWL Programs
DEC ..... BBC, RN highlights; new SW WTJC, Newport, NC

## K.I.S. RADIO

JAN ..... "Doomsday Radio" (survival communications)
MAR ..... Restoring the Hallicrafters S-38
MAY ..... More Mobile Station Solutions
JUL ..... Kits to Keep it Simple
SEP ..... Audio Enhancing Devices (DSP)
NOV ..... Bringing Hidden Treasures to Life

## LAUNCHING PAD

JAN ..... Is this Mess Necessary?
FEB ..... Let's Accessorize!
MAR ..... Putting it all together
APR ..... Prosat DVB Digital Receiver
MAY ..... Satellite Launch Update
JUN ..... Multi-Satellite Reception with a Fixed Dish
JUL ..... Touring the Atlantic Satellites
AUG ..... Zinwell DVB Satellite Receiver; Bob Cooper
SEP ..... Uniden's SQ-590: Last Chance for a Talented Receiver
OCT ..... Hot Tips on Cold LNBs
NOV ..... Your DVB Questions Answered
DEC ..... DBS Update: The Latest on Small Dish TV

## MAGNE TESTS

*(Reprints of Magne Tests reviews are not available.)*

JAN ..... Grundig Platinum Traveller Portable; Drake no longer servicing older models
MAR ..... RS DX-397 Compact Portable
APR ..... Emergency Radio: Info-Mate 837; Sony introduces ICF-SW07
MAY ..... Sony's ICF-SW07 ROM-tuned portable
JUN ..... Luke DP-976 Emergency Radio
JUL ..... Latest Version of Japan Radio's NRD-545; Grundig Yacht Boy 300PE being introduced
AUG ..... Grundig Yacht Boy 300PE
SEP ..... Icom IC-R75
OCT ..... WiNRADiO 1500e PC Receiver
NOV ..... Virtual Radio: Icom IC-PCR1000
DEC ..... Kachina's Proposed KC-105CRX Receiver (a look at Kachina KC-505 tx)

## MILCOM

JAN ..... Monitoring the E-8 Joint Stars; Spectrum holes; NJ mil freqs
MAR ..... The 1999 Air Show Season, Blue Angel and Thunderbird skeds and freqs; US Army MARS freqs and designators; midwest air-to-air loggings
MAY ..... The Hidden Military Aircraft Band; What's on 138.925?; midwest monitoring; Coronet and HF refueling freqs; N. Fla milair freqs
JUL ..... USS Enterprise; MCAS Yuma; NG Y2K Exercise; Naval tailcodes & callsigns
SEP ..... New HF Zulu Freq Found; Mystic Star Update; Randolph AFB; 442nd Fighter Wing presets; Wright Patterson TRS
NOV ..... The Civil Air Patrol; Des Moines Intl and midwest logs; Have Quick freqs; MacDill AFB; Military trunking systems survey

## ON THE HAM BANDS

JAN ..... You can bet on this Bob-tail; *Building and Using Baluns and Ununs*
FEB ..... Restructuring; Radio Shack repeater; *Hiram Percy Maxim*; email
MAR ..... Let's Talk about Ham Radio; The Internet and the Michigan Mighty Mite QRP transmitter
APR ..... W6SAI *HF Antenna Handbook*; *QST* archive projects - Pitchfork antenna, playing checkers on the air
MAY ..... SWLing for hams; Flight of the Bumblebees
JUN ..... Adventure Radio Society; Light House Day and other special events; Hamcalc Ver 38; ARRL web site and Ike's soap box
JUL ..... A Different Antenna (Hentenna)
AUG ..... Is It High Enough?
SEP ..... Clandestine Radio (compact and hidden antennas); 6-m FM
OCT ..... Cutting Your Losses (transmatch); Mosley antennas; entertaining hams
NOV ..... Ike's Santa List
DEC ..... Hamming on the Internet; AM freqs

## OUTER LIMITS

JAN ..... Four SW Pirates Busted by FCC; Joe Mama killed; Metallica
FEB ..... SW Pirates adjust to FCC Busts; R Cochiguaz; Stoneham maildrop closing
MAR ..... Pirate Radio at Winter Fest; R Free Vermont vs. FCC; new S American address; bust update
APR ..... New editors at Free Radio Weekly; New ACE address; Europirates audible; clannie news
MAY ..... Jimmy the Weasel bust; *Radio World* endorses LPFM; W807; Europirates still heard
JUN ..... Radio Free Berkeley Returns; Radio Caroline; Serb Clans?; S Am Pirates
JUL ..... ANARC Net on Summer Vacation; Schoech QSL page; FCC embarrassed; Radio Eclipse wins Poll
AUG ..... Jimmy the Weasel Denies Bust; WBCQ schedule; Radio San Miguel
SEP ..... Numbers Station CD Available (Smolinski); Finn web page; Radiodifusora Paraton
OCT ..... La Voz de Alpha 66 Founder Dies; South American Pirates; Another micropirate bust; Zantow web site
NOV ..... South American Pirates; Berkeley Liberation Radio
DEC ..... Winter Prop Boost Europirates; Clandestine Radio Watch

## PCS FRONT LINE

FEB ..... Protection against cellular fraud (authentication, RF fingerprinting; wireless telephone protection act, subscription fraud, insider fraud, network intrusions); 220 MHz auction
APR ..... Touching Bases: Iridium, Globalstar, AT&T, Sprint PCS, AirCell; Sony phone warning
JUN ..... Surfing the Web on a Mobile Phone – wireless apps, smart phones, GPRS, Bluetooth, Ricochet
AUG ..... Who Pays for that Cellular Call?; new area codes; new spectrum allocations; Global System for Mobiles
OCT ..... Iridium Woes; FBI Stalls Satphone Licenses; Dial 911 Anywhere
DEC ..... The Evolution of PCS, Globalstar, Orbcomm

## PLANE TALK

JAN ..... More HF Control Frequencies
FEB ..... Monitoring Accessories and Activities; western hemisphere MWARAs
MAR ..... March Madness (humor); ATC separation standards
APR ..... ATCC simulation; Murphy's Law; Delta map and Salt Lake City freqs, Minn/St Paul freqs
MAY ..... Enhanced Traffic Management; System; Airport surveillance radar
JUN ..... A Toast to Air Traffic Controllers
JUL ..... Shanwick Radio; Airport Movement Area Safety System(AMASS)
AUG ..... Travel with the Flying Pig (videos); A visit to Poland's ATC
SEP ..... Stockholmradio; SF Bay Tower freqs; transponder code assignments
OCT ..... Airport Hopping - Balt-Wash Intl, Wash Reagan Natl, Dulles Intl, Chicago Midway, St Louis KS, Kansas City Intl; Light Humor
NOV ..... Florida Freqs; Chicago O'Hare; Wash DC; Murphy's Law
DEC ..... Forth Worth ARTCC; book review *Five Miles and a Thousand Feet*; LAX video available from Flying Pig

## PROGRAMMING SPOTLIGHT

JAN ..... Learning to Fish - 1(finding programming on your own)
FEB ..... Learning to Fish - 2
MAR ..... The Literate Listener (books read on air)
APR ..... OK, Where do I start? (beginning listener)
MAY ..... One for the Veteran Listener (quiz)
JUN ..... Down Memory Lane (answers)
JUL ..... Traditional Life (programs which reflect a culture)
AUG ..... Summer Heat: Sport and (BBC) Controversy
SEP ..... Music on SW - Evening Prime
OCT ..... Music on SW - Morning Prime
NOV ..... Music on SW - Foreign
DEC ..... Charting a Future for Int'l Broadcasting

## PROPAGATION CONDITIONS

JAN ..... Worldwide Broadcasting Conflicts
FEB ..... Sounding the Ionosphere
MAR ..... Causes and Effects of Ducting
APR ..... Bibliography of the Sun
MAY ..... Bibliography of the Sun - II
JUN ..... Knife Edge Refraction
JUL ..... ELF/VLF/LF Prop Modes - I
AUG ..... ELF/VLF/LF Prop Modes - II
SEP ..... ELF/VLF/LF Prop Modes - III
OCT ..... Where to Listen in 1999
NOV ..... How to Use This Page
DEC ..... Santa Claus - a Man of Many Modes! (changing navigational modes)

## QSL REPORT

JAN ..... Nordic SW Center Website
FEB ..... Double Dutch Treat
MAR ..... Sign of the Times? (changing QSL policies)
APR ..... Signs of the Times - Part Deux?
MAY ..... The SWL QSL card museum
JUN ..... You Asked for It (no lead-in topic)
JUL ..... Summer Grab Bag (Cambodia, Cumbre DX, MARS)
AUG ..... Hot August QSLs (RTBF)
SEP ..... September, and the DXing is Easy!
OCT ..... QSL VHF Low Band Stations
NOV ..... DXing India
DEC ..... Special QSL Cards for DXers (R Australia and German Maritime Radio)

## SCANNER EQUIPMENT

JAN ..... AOR AR7000 Wide Coverage Receiver
FEB ..... Radio Shack PRO-2066 Mobile Trunking Scanner; Improved feel for Drake R8B tuning knob; Download Uniden user manuals

MAR ..... ICOM RS-8500 Software; PRO-34 discriminator output
APR ..... Icom IC-R2 Portable Scanner; ITT Mackay Marine 3031A rcvr
MAY ..... Remote Scanner Monitoring; Longer MX-4000/4200 battery life; PRO-7A repair
JUN ..... Mini-Circuit's ZFSC-4-1 Splitter; more notes on Icom IC-R2; new Electra Corp scanner?; Batteries Plus; Skyway aircraft band converter
JUL ..... Racing Electronics RE2000 Alpha Portable Scanner; May column correction
AUG ..... AOR AR16 portable scanner; Harris RF-590 receiver
SEP ..... Uniden BC245XLT TrunkTracker II
OCT ..... Plectron R700 Monitor Receivers
NOV ..... Uniden BC278CLT Scanner
DEC ..... Uniden BC248CLT Scanner

## SCANNING REPORT

JAN ..... Flying and Scanning by GPS
FEB ..... A Lesson from Boston Police Radio; lesson about messing with the media; Police Call 1999
MAR ..... Future Railroad Scanning (trunking debate); scanning antennas & Nil-Jon antenna review; Massachusetts Monitoring (part 2, completed)
APR ..... CES 99 Report; BC-245XLT announcement; CT state police update; scanner repair (G&G Comm); Ft Worth TX public safety sys; Savannah / Chatham Co / Tybee Is. GA trunked repeater system
MAY ..... Scanner Marketing-you tell us; Disaster monitoring in Canada; Utah Co UT trunking; Montgomery Co PA trunking; Ericsson plans in N Calif
JUN ..... CT SP on the Move; Nil-Jon antenna follow-up; contributions & queries from readers; Trends in pub safety comms
JUL ..... The Digital Dilemma; open airwave policy in Las Vegas; Longview, TX, trunking; NWS computer-generated voice
AUG ..... The Bearcat 245XLT - What's it all about?; Palm Beach Co FL sheriff, fire/rescue, W Palm Beach trunked system
SEP ..... The Good Old Days (LAPD comms on Adam-12); Scanner Marketing follow-up; Busch Stadium, Halifax, Portland, trunked systems
OCT ..... Canadian Digital Scanners; Groton CT Fire Dispatch; Promoting Scanners; Consolidation Continues; Wash State Ops; Southern Linc Blues; Wilmington NC Trunking
NOV ..... Big Changes in the Big Apple; scanner marketing follow-up; Wash Co OR trunking; new CA business licenses
DEC ..... Uniden's SmartScanner (how service works); Trunking Report (Pinellas and Pasco Co, Fla); Police Call excerpt Vol8

## SERVICE SEARCH

MAY ..... Marine Radio Monitoring
JUN ..... Civil Aero Assignments
JUL ..... Gearing up for a Revolution (refarming); State Law Enforcement Agency Allocations
AUG ..... Emergency Medical Allocations
SEP ..... Forestry Conservation (state & local)
OCT ..... Police Service Allocations
NOV ..... Highway Maintenance Service
DEC ..... Fire Frequency Allocations

## UTILITY WORLD

JAN ..... Rescue Coordination 1999
FEB ..... Listen for USAF Salinas Global (GHFS)
MAR ..... More Israeli Intelligence Freqs
APR ..... Sunspots (solar cycles and how to interpret solar indices reports)
MAY ..... Monitor the Y2K Countdown
JUN ..... More Maritime Changes; Numbers update; HWK7 not French Navy
JUL ..... Are Planes Going Digital? HF ACARS; More New Star
AUG ..... Globe Wireless jumps the Morse ship, Global Radio Network
SEP ..... Updated CG Wx Sked; drug war leaves Panama; web ute resources; bogus numbers BCs
OCT ..... Spooks around the Clock; More Cuban Strangeness; Spook Radio Schedules
NOV ..... US Armed Forces on HF?
DEC ..... Y2k, the Witching Hour Approaches - likely activity , freqs, dates, agencies, callsigns, nets

## VIEW FROM ABOVE

JAN ..... Wild and Wooly Weather (Wxsats; Resurs; GOES-8; STS Orbit plus; Kepler element sources)
FEB ..... Using Primary Data formats
MAR ..... Watching Iraq; operational Wxsats; Polar Wxsat status; Sich-1 and Okean-4; GOES Y2K tests; GOES-L; solstice images
APR ..... Scanning the Weather Sats
MAY ..... So GOES the weather; DMSP image; new products
JUN ..... Storms over Yugoslavia; NOAA-15 Chan 3A,B; NOAA APT Calibration markers; NOAA-15 data drop-outs; Using NOAA data
JUL ..... Beauty and the Beast - antennas, computer upgrades; operational wesats; new Chinese Wesat; new Landsat launched; new Indian imaging sat; first pics from Insat-2E; correspondence from India
AUG ..... Seasonal Satellite Viewing; FengYun-1C; Free tracking software; Wxsat launches; GOES-L launch delayed
SEP ..... WeSats Here to Stay: GOES Wefax; Wxsat emailing list; GOES-L launch delay; more software and updates; images of hot weather
OCT ..... Way to Go, GOES! NOAA information sites; sources of current Kepler elements
NOV ..... More on GOES-East; operational Wxsats; short-term outages from GOES
DEC ..... To Build or to Buy?; Operational Wxsats; Iceberg imaged; EMWIN; GOES-East

## WASHINGTON WHISPERS

JAN ..... FCC Curbs Violations
FEB ..... Renter's antenna rights; new WTB bureau chief; Sony recall; HDTV future
MAR ..... FCC agenda for 1999; coalition petitions FCC to let market determine high speed Internet; e-commerce and reforming FCC on Congress agenda; low power FM NPRM on FCC website; 19 pirates shut down; equipment approval system privatized and streamlined; real estate alliance appeals satellite dish ruling
APR ..... FCC Proposes Low Power FM Service
MAY ..... NR514 passes House; Tauzin opposes LPFM; taxing internet coming; FCC shuts down Vibes 89.1 FM , Grizzly Peak repeater, ham operators
JUN ..... Amateur Satellite (was) to Promote Commercial Venture
JUL ..... From Information Superhighway to Super Speedway!
AUG ..... EAS vs EBS; Israeli ATC vs pirates; reduced Morse code requirements worldwide; area code shortage; FCC investigating 10-10 services; FCC reconsiders slamming; annoying email violate US law?
SEP ..... Low Power BCing Creates Uproar
OCT ..... LPFM Broadcasting not RFI Threat
NOV ..... The Migration to Digital Radio
DEC ..... Reply Comments Pour in on Low Power FM Broadcasting

## REVIEWS

Active Duck for Handhelds ..... DEC
Alpha Delta speaker / Icom Q7A Tx ..... JAN
AVCOM SDM42A SDU ..... APR
Bose v. Zenith Challenge ..... MAR
Crane/Sangean CCRadio ..... FEB
E-Trax software utility ..... SEP
EXP-1750 LF transceiver kit ..... JUN
JRC NRD545 with VHF/UHF converter ..... MAY
Kachina 505DSP ..... OCT
Klockit clock kits ..... NOV
Kloss Model 88 AM/FM radio ..... JUL
MFJ Deluxe Noise Canceling Signal Enhancer MFJ-1026 ..... AUG
OptoCom receiver (feature) ..... MAY
Radio Shack Tuner Control Cleaner & Lubricant ..... AUG
Sony ICF-B200 ..... MAR
Tigertronics BP-2M digital modem ..... DEC

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# Glossary

A Glossary of radio related terms used in *Monitoring Times*. (See www.grove-ent.com/mtglossary.html for a much more comprehensive list.)

## THE RADIO SPECTRUM

ULF - Ultra Low Frequency (3-30 Hz)
ELF - Extremely Low Frequency (30-300 Hz)
VF - Voice Frequencies (300 Hz-3 kHz)
VLF - Very Low Frequency (3-30 kHz)
LF - Low Frequency (30-300 kHz)
MF - Medium Frequency (300 kHz-3 MHz)
HF - High Frequency (3-30 MHz)
VHF - Very High Frequency (30-300 MHz)
UHF - Ultra High Frequency (300 MHz-3 GHz)
SHF - Super High Frequency (3-30 GHz)
EHF - Extremely High Frequency (30 GHz and above)

// - Indicates a Parallel Frequency
µF - Microfarad
µH - MicroHenry
AC/ac - Alternating Current
AGC - Automatic Gain Control
AM - Amplitude Modulation
ARRL - American Radio Relay League
BCB - Broadcast Band (530-1705 kHz AM)
Bd - Baud
BFO - Beat Frequency Oscillator
BNC - Coax connector commonly used with VHF/UHF equipment
CB - Citizen Band
C-band - 3.7-4.2 GHz
Comm - Communications
CQ - General call to all stations
CTCSS - Continuous Tone Controlled Squelch System
CW - Continuous Wave (Morse code)
DAB - Digital Audio Broadcast
dB - Decibel; dBi- decibels over isotropic
DBS - Direct Broadcast Satellite
DC/dc - Direct Current
de - Morse code prosign meaning "from"
DSP - Digital Signal Processing
DTMF - Dual Tone Multi Frequency
DTRS - Digital Trunk Radio System
DX - Distant Station Reception
DXer - A person who engages in the hobby of distant radio/television reception
DXing - The hobby of listening to distant radio or television signals
DXpeditions - DX Expeditions (trips to the boonies by radio listeners)
ECPA - Electronic Communications Privacy Act
ECSS - Exalted Carrier Selectable Sideband
E-skip - Sporadic E-layer ionospheric propagation
FCC - Federal Communications Commission
FD - Fire Department
FM - Frequency Modulation
Freq - Frequency
FRS - Family Radio Service
GHFS - Global High Frequency System
GHz - Gigahertz
GMDSS - Global Maritime Distress and Safety System
GMRS - General Mobile Radio Service
GMT - Greenwich Mean Time (replaced in most applications by UTC)
GPS - Global Positioning Satellites
GSM - Global System for Mobiles (900 MHz)
HT - Handi Talkie/Handheld Transceiver
Hz - Hertz
ID - Identification
IF - Intermediate Frequency
IRC - International Reply Coupon
ISB - Independent Sideband
kHz - Kilohertz
km - Kilometer
Ku-band - 11.7-12.2 GHz (plus 12.2-12.7 GHz in North America)
kW - Kilowatt
LCD - Liquid Crystal Display
LED - Light Emitting Diode
LNA - Low Noise Amplifier
LNB - Low Noise Block Downconverter
LNBF - Low Noise Block Downconverter Feedhorns
LSB - Lower Sideband
LT - Local time
LW - Longwave (150-300 kHz)
mb/MB - meter band/Megabyte
MDT - Mobile Data Terminal
MF - Medium Frequency
MHz - Megahertz
ms - milliseconds
MT - Monitoring Times
MUF - Maximum Usable Frequency
mW - Milliwatt
MW - Medium Wave (typically 530-1710 kHz)
MW - Megawatts
NCS - National Communications System/Net Control Station
NDB - Non-Directional Beacon
NFM - Narrowband Frequency Modulation
NiCd - Nickel Cadmium Battery
NiMH - Nickel Metal Hydride battery
No Joy - Station did not answer call
NWR-SAME - National Weather Radio Specific Area Message Encoding
Ops - Operations
Packet - Amateur radio error correcting mode
PC - Personal Computer/Printed Circuit
PCS - Personal Communication System/Satellite
PD - Police Department/Primary Data
PFC - Prepared Form Card
PL - Private Line
Q - Performance rating regarding selectivity or bandwidth
QRM - Interference from another station
QRN - Interference from natural or man-made sources
QRP - Low power operation
QSL - A card or letter confirming reception of a radio station
QSO - Communications between two or more stations
QTH - Location
RDF - Radio Direction Finding
RF - Radio Frequency
Rptr - Repeater
RTTY - Radioteletype
SASE - Self Addressed Stamped Envelope
S-band - Microwave frequencies above UHF
SCA - Subsidiary Carrier Authorization (now known as SCS)
SCPC - Single Channel Per Carrier
SCS - Subsidiary Carrier Service
SELCAL - Selective Calling
Sesqui - A "Hauserism" meaning one and one-half
SINAD - Signal to noise and distortion ratio
SINPO - A code system used by radio hobbyists to indicate how well a station was received: S=Strength, I=Interference, N=Noise, P=Propagation, O=Overall (sometimes shortened to SIO)
SITOR-A(B) - Simplex teleprinting over radio system, mode A (B)
S-Meter - Signal Strength Meter
SMR - Specialized Mobile Radio
S/N Ratio - Signal-to-Noise Ratio
SSB - Single Sideband
SSN - Sunspot Number
SW - Shortwave (high frequency - HF)
SWBC - Shortwave Broadcast
SWL - Shortwave Listener
SWR - Standing Wave Ratio
Tac - Tactical
Tent - Tentative
TIS - Traveler Information Service
TVRO - TV Receive Only
Tx - Transmit
UHF - Ultra High Frequency
UKoGBaNI - United Kingdom of Great Britain and Northern Ireland
ULS - Universal License System
Unid - Unidentified
USB - Upper Sideband
UT - Universal Time
UTC - Universal Time Coordinated
Vac/VAC - Volts Alternating Current
Vdc/VDC - Volts Direct Current
VFO - Variable Frequency Oscillator
VOLMET - Aviation Weather Broadcasts (on HF)
VOX - Voice Operated Relay
VSWR - Voltage Standing Wave Ratio
WAM - Wideband Amplitude Modulation
WEFAX - Weather Facsimile
WFM - Wideband Frequency Modulation
wpm - Words Per Minute
WWV - National Bureau of Standards Time Station, Ft. Collins, CO
WWVH - National Bureau of Standards Time Station in Hawaii
Wx - Weather
WXSAT - Weather Satellite
X-band - Expanded AM broadcast band (1610-1700 kHz)
Zulu - Military time zone (same as UTC)

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| Bearcat 895XLT-A1 300 ch.TrunkTracker base scanner | $194.95 |
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| ICOM ICR8500-A1 wideband communications receiver | $1,499.95 |
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# How House Wiring Works

To avoid having major bouts of neurosis as we walk through life, we try to take a certain number of things for granted. One of these things tends to be our common house wiring. We tend to figure, as long as we don't mess with it and we don't smell smoke, things are probably okay. True, a properly wired house should allow any home owner to sleep soundly, but I don't think anyone would want to remove their smoke detectors and cancel their fire insurance, either!

One of the facts of life is that the wiring in some homes is not up to standard, and this can be cause for concern. It is of concern to any radio monitoring hobbyist because, at the very least, improper wiring can manifest excessive static when monitoring HF. Or worse, improper wiring can lead to circumstances that allow you to hear your home address being broadcast over your local Emergency Services frequencies as Fire and EMS personnel rush to your aid.

What brought this subject to the table this month was, as usual, a personal experience. The home location of Amateur Radio Station N2EI is in a big old house that was built in the early 1900s. The property includes an electrified outbuilding/garage and front yard lighting.

A glance at the property's wiring shows several periods of modernization. Then, when we moved in, we had the main service box size increased to meet the needs of a modern household that also included way more radios and computer equipment than most folks would ever have use for. Some small tasks remained to bring the house all the way up to the best it could be. This included the replacement of a few old-style plugs that did not have a ground connection. It was in the process of replacing one of these older "two prong" plugs that I ran across some real trouble.

## Learning the Hard Way

The plug was behind a piece of furniture (specifically, a piano) and, as far as I knew, hadn't been in use for as long as I

was in this house (the piano came with the house). I had thrown the circuit breaker that (I thought) de-energized the circuit in question and set about the task of putting in a modern "three wire" plug. Inside the plug box, I was presented with (again, I thought) four allegedly de-energized wires: two that should have represented the electricity coming into the box and two indicating that the box was part of a branch circuit that went off to another plug somewhere down the line.

Still, I am a cautious sort of guy. That is why I have managed to outlive most of my enemies. I remember the words of me old High School Electronics teacher Col. "Blinky" Austel. "Always treat any circuit as if it was alive and out to take your life!" I put a meter to the wires and, much to my surprise, found one pair of wires dead but the second pair energized with 120 volts AC.

When I kicked the breaker back on and (very carefully) took a reading across the wiring, I found 240 volts AC. This is really not good. This is *very very really really* not good at all. I knew immediately that, whatever was happening, it was well beyond my "Do It Yourself" level of house wiring understanding. This was supposed to be a dead circuit and I'm finding twice as much juice in it as should appear under normal conditions. I capped all four wires with wire nuts and grabbed the telephone. It was most definitely time to call in the professionals. I got my friendly local electrician on the phone and let him take things from there.

So at this point in Uncle Skip's tale of woe, we have already pointed to a number of key safety points when dealing with household electricity.

1) Do not, under any circumstances, perform any household electrical wiring unless you have the necessary knowledge to do the work safely.
2) If anything appears to be wrong or out of specification get professional help immediately.
3) Even circuits that logically appear to be de-energized may carry deadly voltages. Treat all wiring as live wiring.

Okay, so right off the bat, I was trying to save a few bucks by doing some of the work myself. In retrospect, $35 an hour to an electrician is a heck of a lot cheaper than the replacement cost of the average household. Further, careful reading of some home insurance polices will indicate that household wiring performed by anyone other than a licensed professional can render said policy about as useful as the paper in the bottom of a bird cage.

## Untangling House Wiring

Now, having said all that, it's time to learn a little bit about how electricity gets into your house. It's more interesting than you might think. Start by taking a walk outside to see where the wiring comes into your house from your service pole. (Note: If you live in one of those neat new communities that has their wiring all underground, you probably are also living with antenna restrictions, so I probably need to address your problems in a future column. You folks can skip down a few lines.)

In most cases, you will see three fairly thick wires leading into your electrical meter and on into your house. Two of those wires are carrying 120 volts AC and are considered the "HOT" wires. They are

usually represented by the BLACK wiring within the house. The third wire is called the "NEUTRAL" and is usually represented by the WHITE wiring within the house.

Now here is where things get interesting. While you obviously see three wires, your house actually has a four wire system. In addition to the three wires coming down from the pole, there is also a **ground** wire that connects to a ground stake or your cold water pipe (depending on local code). The ground wire, as it connects throughout your house, is usually an uninsulated wire or a GREEN wire depending on the circumstances.

At your house's **circuit breaker panel**, you will usually find that each of the 120 volt hot lines take up half of the circuit breakers in the panel and feed electricity to the various branch circuits throughout the house. These two hot lines share the common neutral. Further, the neutral and ground lines are connected together at the panel as well.

If you were to look inside a standard plug box (and I've just given you a whole bunch of reasons not to), you would see one black wire (hot), one white wire (neutral) and an uninsulated wire (ground). If you were to take a volt meter and read from the hot wire to either the neutral or the ground wire you should read 120 volts. If you were to find any other case but this, something is wrong.

## Check It Out

There is a very easy way to check out your house wiring safely, and I strongly recommend this process to everyone because, as we shall see later, wiring can change. Your local home improvement or electrical supply store will be happy to sell you a circuit tester that checks for proper house wiring. There are a number of variations and brand names, but essentially this is a small unit that plugs into an outlet. The device has three small light bulbs on it, usually two yellow and one red. When plugged into a wall socket these little bulbs light up in different patterns to tell you the condition of the wiring of the branch that particular plug is on. A quick trip around the house with one of these can tell you if you have anything to worry about as far as correct wiring polarity goes.

If you happen to be house hunting, you will want to bring one of these testers with you on your inspections. Also, think of things from a radio monitoring perspective. Would you want to plug that shiny new receiver you just spent three months salary on, into a plug that could potentially damage it? Okay, you've probably guessed it...I didn't check that plug when I moved in because, at the time, it was behind the piano.

By this point you are probably wondering about those larger appliances such as stoves or clothes driers that are wired up to run on 240 volts. Your house is able to provide this higher voltage at the circuit breaker panel by using special circuit breakers that take the two hot 120 volt lines and make them into 240 volts. Remember how I was seeing 240 volts at my plug? We're drawing a bead on the solution.

The problem at Old Uncle Skip's house, as it turns out, involved the fact that the house had several previous periods of "modernization" of its house wiring over its almost hundred year history. I was to discover that wiring practices, like many other things in life, go in and out of fashion. At some point in time, the particular plug in question had been part of a circuit that had a pair of "three-way" switches in it. You may have such a circuit in your house. They are used to allow a light or a plug to be turned on or off from two different locations. This involves an additional run of wire between the two switches.

When setting up such a circuit under modern conditions, the wiring is uniquely marked to prevent mistakes in identifying the hot and the neutral side of the circuit. In this case these wires were not so marked. When I looked into the plug box, I saw two black wires and two white wires. What I was expecting was that one pair was the energized pair and the other pair led off to the rest of the branch.

What I actually had was two hot wires, one from each side of the circuit breaker panel that showed me 240 volts. The part of the circuit that came from the old three way switch line had still been energized through another breaker when I took my first measurements.

## Knowing When to Call the Pros

Now here is a very important thing to note. Had I thrown the main circuit breaker, killing all the power in all the branches of wiring in the house, I wouldn't have seen that "extra" 120 volts in that plug box when I examined it with my meter.

Had I not checked the wiring before trying to install the plug, one of two things could have happened. I could have been electrocuted and this column would have been written by my successor, no doubt with many wonderful words about what a great guy Old Uncle Skip was. Or, there would have been some interesting popping and crackling sounds coming from the plug box and, if the main breaker didn't kick out fast enough, a rather glorious effort by my local fire department to save my humble abode.

Of course, I am saying this in hindsight. It took that professional electrician quite a bit of investigation to get to the root cause of my problem and I am very grateful for his efforts because the potential for tragedy was clearly there.

Remember folks, this hobby is all about having fun. But peace of mind comes from knowing when to call in the pros.

# Ask Bob

**Bob Grove, W8JHD**
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*Q. Can I increase the signal strengths of my active shortwave antenna by lengthening the element? (E. Saska, Scarborough, ONT)*

A. Yes, and you will increase the overload problems of intermodulation at the same time; don't do it. The manufacturer has chosen the correct element length consistent with adequate gain with the least amount of strong signal overload.

*Q. What factors contribute to audio quality in a shortwave receiver? (Per G. Ruuth, North Highlands, CA)*

A. Many fine high frequency (HF) communications receivers on the market have only mediocre audio quality. Since we are talking about the shortwave bands where signals, by international agreement, are separated by 5 kHz, amplitude modulated (AM) broadcasters must limit their audio bandwidth to minimize interference with adjacent channel users.

In the competitive spectrum of international broadcasting, interference is severe, so receiver manufacturers frequently enable narrow-bandwidth filters in an effort to reduce unwanted noise. As a result, the narrowing of the broadcasters' bandwidth at their own transmitter sites reduces high frequencies (treble), contributing to "muddy" reception, and the receiver's filters limit it even further, often resulting in bassy sound.

Some companies, like JRC, have an extra-wide bandwidth for AM (10 kHz in their NRD545), while other manufacturers, like Drake, limit their maximum AM bandwidth (6 kHz in their R8 series). The wider bandwidths work for strong, uninterfered-with signals, improving crispness of audio remarkably.

But bandwidth isn't the only criterion for quality sound; the audio amplifier, linearity of RF, IF, and detector circuits, and choice of an internal speaker are to blame for distortion of the original audio. Even the receiver cabinet (metal, wood, plastic) will have considerable influence on the resultant sound.

Some listeners purchase external speakers, or even amplified speakers, operating them from the record output jack to avoid the receiver's internal audio circuitry.

*Q. What effects do nuclear weapons tests have on radio communications? (Donald Michael Choleva, Eastlake, OH)*

A. "Fireball blackout" as it is called, can cause enormous, but temporary, disruptions in radio propagation for hundreds, or even thousands, of miles. Microwave frequencies, including radar, may be blocked for several minutes, while shortwave communications can be disrupted for hours, depending on conditions.

*Q. How does the FCC assign call letters? At one time, not only were AM broadcasters, but land mobile services as well, given blocks of call letters depending upon their geographical regions. This enabled DXers to get some idea where in the country signals were coming from. Is that still in effect? (Sol Elbaum, e-mail)*

A. No, that's no longer true. My consultant in the FCC's data department says that now that licensees can move geographically and still keep their call signs, and since blocks of call signs originally reserved for one service have been reassigned to others, it is no longer possible to determine the location of a U.S. licensee by his call sign.

*Q. A pirate radio station claims to be running 10,000 watts of power. Is this feasible in a residence with only 240 VAC as the high-power mains? (Mark Burns, Terre Haute, IN)*

A. Believe it or not, yes. Your oven and range can burn that much power by themselves, then there's the water heater, electric furnace – you get the picture!

*Q. What is the difference between a relay and a solenoid? Can the two terms be used interchangeably? (Mark Burns, Terre Haute, IN)*

A. No. A solenoid is an electromagnet, a coil of wire around a core, usually iron. A relay is a remote switch. The relay switch is activated by the magnetic field produced by current in the solenoid.

*Q. Should I mount my active shortwave antenna in a vertical or horizontal plane? (E. Sasko, Scarborough, ONT)*

A. At shortwave, especially over long distances, it won't make much difference. Shortwave signal patterns scatter, mixing the relative polarizations of the waves, so there will be virtually identical amounts of electromagnetic energy available in any position of the active antenna whip. And while it is true that for any given signal at a particular time there might be a favorable tilt angle, this will change with time, frequency, and location of the station. That's why shortwave portables have hinged attachments to their whips.

*Q. I am using RG6/U coax (70 ohm impedance) for my scanner antenna cable, but the scanner is designed for 50 ohms impedance, and the antenna switch is as well. Is the loss from the various mismatches worse than if I used a lossier 50 ohm coax? (E. Sasko, Scarboroough, ONT)*

A. A good question! Essentially, a 50-to-70 ohm impedance mismatch represents a loss of only a fraction of a dB, even if you have the switch in line (assuming the insertion loss of the switch is low). That shouldn't be the criterion for your judgment. Stay with the low-loss cable regardless of the impedance mismatch. After all, no antenna maintains a perfect 50 ohm match over the wide frequency excursions of modern scanners anyway.

Questions or tips sent to "Ask Bob," c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bgrove@grove-ent.com. (Please include your name and address.) The current "Ask Bob" is now online at our WWW site: www.grove-ent.com

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# Get Organized!

Everyone, even a beginner, has a better way of operating that they have learned through experience (like, "oops, I should have read the manual first!"). Recently I sat down to begin enumerating some operating tips for better HF, VHF, and UHF monitoring. It soon filled 14 pages! So this column was created to pass along my tips and to solicit your inspired solutions.

At the end of each suggestion, I have indicated the cost range. Most are no cost, and all others are less than $20. My goal is simple; to help you enjoy monitoring. I hope you'll find this column a "must read" and that you'll contribute your bright ideas to the email address above or to this column via the *Monitoring Times* address. Caution, don't skim through this column because the concepts may sound simple; a gem may be buried within a single sentence!

I suggest you gather the following items, as we will do some simple hands-on projects this month:

- Yellow highlight marker
- Avery colored labels (the round ones 3/4 inch in diameter, the rainbow variety pack #05474)
- A three hole binder, preferably the type with the see through plastic cover jacket
- Scotch tape (clear 3/4 inch wide)
- A box of heavy duty plastic page protectors, such as Avery PV119
- Small Phillips head screwdriver

You might need a trip to the office supply discount store. Although I mention Avery®, and Radio Shack® (RS) by name, there are other products that will meet your needs. As you read, use the yellow highlight pen to mark those items that appeal to your interests.


Having accumulated several scanners and assorted radio devices, I discovered that some used 6 volts, others rely on 9 or 12 volt power sources. Most have the center tip as positive, but a couple have the outside of the plug for positive, and the center as ground.

Well, I admit it; I eventually plugged the wrong wall charger into the wrong scanner, and *poof*! A funny smell quickly alerted me, but too late. I vowed to never do that again. So I marked all my power sources, radios, and scanners with Avery Color Labels. I prefer the ones that are round, and about 3/4 inch in diameter.

I found seven different configurations of plug size, voltage, and polarity. So I needed seven different colors. To get *double use* from the labels, I wrote my amateur callsign on the label. You could substitute your name, and/or phone number. Remember to write very small!

I placed labels on the back of the radio and on the top of the wall charger. I then placed a small piece of clear scotch tape over the labels to insure their longevity. As a backup indicator, I folded another label over itself near the end of the plug where it connects to the radio. Again, I used scotch tape to seal the deal.

You must get the right color matchups. With several plugs growing from a tangle of power supplies, you can never be too cautious. You can use cable ties or split tubing to control the chaos.

I also labeled my considerable collection of extra batteries and accessories for my ham radio gear. All of my radios and power sources now sport matching labels in blue, orange, lime green, etc.

Cost: About $5 for labels which have many more uses.


With several radios, I sometimes forget what I programmed into which scanner. You can make a list. Example: Bank 1 Police, Bank 2 Fire, etc. In my word processor, I made tiny labels in 8 point-type and cut them to size. Again, I used scotch tape to adhere one to the back of the radio, and another inside the battery compartment. (Occasionally, you must temporarily remove the belt clip to have access to the back of the radio.)

Cost: Nothing but your time.


Get Organized! Use a 3-ring binder to hold all your scanner-related materials. I prefer one with the clear plastic pocket for the cover. Here is where I place my one page of "local information," viewable at a glance.

In the binder I keep printouts of my frequency lists and reference information such as local 10 codes, maps, ham band allocations, and the like. In outdoor or mobile work an unprotected sheet of frequency information has a very short life span, so use individual sheet protectors for pages related to these activities.

I also use the sheet protectors on the covers of my softbound reference books such as ***Police Call***. Cut the sheet protector about half an inch inside the left three-hole side. Slip onto the book cover, and secure with scotch tape. This keeps much-used reference materials looking new for long time. No more dog-eared covers for this guy!

Cost: A few bucks for the binder, and *heavy duty* sheet protectors. Hint: cheap, thin protectors will not last.


Over the years, I have found that radios need a little mechanical maintenance, especially hand carried scanners and ham transceivers. Every few months you need to use a small Philips screwdriver and retighten those little screws. Don't forget to check inside the battery compartment.

Cost: nothing.

If you have lost any screws, I will tell you next month how to find replacements.

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# Airborne Scanners – Grounded Again?

One of our favorite scanning pastimes is scanning "on the fly." Yes, we're talking once again about scanning while flying on a commercial airliner. Delta is one of the few, if not the only, major carrier that had been allowing "VHF scanner receivers" on board above 10,000 feet.

When the flight attendant announces over the P.A. system that it's OK to use portable electronic devices, that has been the cue to drag out your laptop (if you're the average businessman), or your scanner (if you're a member of this little hobby of ours). While signals below 400 MHz usually won't make it through the skin of a plane, signals above 400 MHz barrel in as though you have the ultimate 35,000 foot antenna in the sky – which of course you do. (Note: You do generally need to be seated at a window.)

Our friend and south Florida scanning guru, Brain Cathcart (a.k.a. The Scanner Dude), recently posted a very disconcerting e-mail on this subject:

"For all you frequent flyers out there, listen up – Delta Air Lines has changed its policy regarding the use of scanners on board aircraft. I believe the change took place when they finally decided to allow use of cellular phones while on the ground with the door open (how ironic)."

The 'old' rule allowed use of scanners in the same way as other electronics – i.e. use it only after reaching 10,000 and not during taxi, takeoff, or landing. Now the rule reads as follows:

"The following devices may not be operated at any time on board Delta aircraft.....commercial two-way transmitters (walkie-talkies); amateur transmitters (ham radios); citizen's band (CB) transmitters; 49-MHz transmitters; VHF scanner receivers."

I asked a Delta pilot friend of mine about this sad turn of events. He responded on November 3rd with the following letter:

"Rich, the current policy on scanners on Delta aircraft is that they are still allowed. The publication that authorizes this is what's called the FOM (Flight Operations Manual). Every crew will have a copy of this manual with them, and its information supercedes whatever information is in the foldout information card stuck in the seat back. I have included the relevant pages so you can read it for yourself. In practice you may have to ask the pilots for permission if the flight attendants have bad info on this. Tell them the policy is on page 11-9 of the FOM. Of course the manual is updated regularly and policies change, but as of today this is the current policy. There have been no revisions regarding this issue."

This certainly was encouraging news (and wouldn't it be fun to tell a flight attendant to look on page 11-9 of the FOM!). The page that was provided also specifically mentioned that it was acceptable to use a GPS unit above 10,000 ft. Using GPS on board, as we've discussed in past issues, is great fun.

In discussing this matter further, Sheldon, WA4MZZ, provided some very interesting insight:

"…Since Delta allows only VHF scanners, from a very narrow point of view, there are almost no VHF-only scanners on the market, so, I suppose from a purist standpoint, the old Delta policy looked like they allowed unlimited use of scanners, during the electronic equipment use part of flight, but since the average scanner was also covering other bands, these scanners, in theory, did not meet the VHF-only Delta criteria."

While Sheldon might be semantically correct, my take has always been that since scanners are always VHF/UHF (and some HF in the high-end units), that Delta really has had no problem with any type of scanner. To say "scanner" and "VHF only" makes no sense.

Whether or not a scanner has any effect on navigational or other equipment is not for me to judge. I would gather, though, that 50 laptops running in the passenger cabin would put out more RF, something upon which my pilot friend wholeheartedly concurred.

Sheldon was one step ahead of me, however. He too had been perplexed over the incongruous language. He writes:

"I first saw the Delta policy on a flight from Munich to Atlanta in 1994 and thought the VHF scanner policy by Delta was a step in the right direction, allowing the use of scanners while in flight. On the other hand, I recognized the restriction and that prompted a letter to them, and as I mentioned above, they basically said VHF scanners only.

"My take on it was that it appeared on the surface that Delta was permitting scanners in use during flight, but unless you had a VHF only scanner, it still could not be used. Since almost all portable scanners are VHF and UHF, Delta's policy still kept them off and in the briefcase. Based on today's portable scanner market equipment availability, to say portable scanner and VHF only makes no sense, but maybe that Delta policy was really written by someone who was radio sharp, and had a sense of humor? I wonder if Delta actually had some experience with scanner caused problems, or, perhaps more importantly, problems with scanner owning/carrying passengers or if they are just joining all the other airlines with a more uniform policy?"

On July 27, 1994, Sheldon wrote to Delta for clarification:

"The specific terminology refers to the scanner receivers as VHF, (yet) is that a strict interpretation of the normal term VHF (very high frequency), as covering the 30 to 300 MHz frequency spectrum, or would any of the generally available portable scanners fit the acceptable portable electronic device category of the VHF scanner receivers, even if they cover frequencies outside the 30 to 300 MHz frequency range, as most of them do today?"

The reply from Robert R. Collier, Senior Coordinator of Public Affairs, Delta Air Lines, of September 12, 1994, was: "In response to your inquiry concerning VHF scanner receivers, our authorization applies to scanners that operate solely in the 30-300 MHz band. As you mentioned, most commercially available scanners operate well above that band, typically up to 1000+ (plus) MHz, and therefore would not be acceptable."

"Rich, that pretty much summed it up.....unfortunately, I guess I got an answer I was afraid they would tell me....and that is why I say that Delta appeared, on the surface, to permit scanners, but since the only permitted scanner was a VHF only unit, it pretty much limited what they were telling the public could be used.

"As it appeared Delta was authorizing VHF scanners, in the same letter, I also asked if a VHF HT could be used for listening purposes only, while in flight. Mr. Collier replied:

"In response to your second question, the interference mechanism that we are concerned with is the emission of electromagnetic energy from the local oscillators, amplifiers and mixers that are used when generating the Intermediate Frequencies (IF). Since the oscillators are running even when the transceiver is not transmitting, the unit can cause interference and therefore, they cannot be allowed to operate aboard our aircraft."

"Of course, he is correct, to a point, the LOs (local oscillators) are operating in the receive mode, but I did not have the heart to bring to his attention that the same LOs he is concerned about in the transceiver receive chain also exist in each and every scanner.

"I understand the concerns of the airlines for flight safety, And I am very concerned if I am in the back of the aircraft, while the pilot is trying to do an instrument approach down to minimums, so I will be glad to turn off anything in the cabin that will help him make sure that the aircraft is on the localizer and glide slope properly. On the other hand, considering the proliferation of electronic equipment used in the newer flight entertainment systems, multiple movie channels, pay telephone service, in-flight gambling, whatever, I find it amazing that the average scanner has enough LO radiation to ever interfere with the nav/coms."

## The New Band to Scan?

The public safety community, like all others with an interest in acquiring radio spectrum, has been clamoring for a slice of the television broadcast pie. As TV stations migrate to digital formats, and as frequency availability continues to shrink toward zero, the thought of 60-odd megahertz of spectrum (746-806 MHz approximately) opening up has many in radio salivating.

The impetus for public safety's acquisition of this spectrum was borne out of the World Trade Center bombing in New York a number of years ago. Numerous state, local and federal agencies responded to the scene and there was a complete lack of radio interoperability. The idea that all these agencies would one day end up on a common 700 MHz system seems rather far-fetched, but a cry for a better radio command and control structure in the face of terrorism is hard to ignore on Capitol Hill.

UHF television stations have yet to migrate off of the upper-end of this spectrum and two-way manufacturers have yet to produce any equipment for the band, yet there are agencies looking closely, and longingly, at developing a 700 MHz system. The most notable perhaps is New York state, which hopes to create a statewide system on the band.

At APCO's (Association of Public Safety Communications Officials) Atlantic Chapter conference in Maine this past October, a seminar was held on NYSWCN (New York Statewide Wireless Communications Network). Dan Cottrill of NYSTEC (New York State Technology Enterprise Corporation) and Bob Schlieman discussed the budding system and focused on problems creating the network along the Canadian border.

It seems that Canada has its own plan for digital television, using channels 62 through 69, which would put stations on or near the New York border smack in the middle of the 746-806 MHz spectrum. According to the New York representatives, 700 MHz would be unusable in large portions of Ohio, Michigan, Pennsylvania, New York, Maine, New Hampshire and Vermont, should the Canadian plan be implemented.

It is hoped that the regulatory commissions of the two nations will be able to resolve the conflict, but as of now NYSWCN can't proceed without some sort of resolution, at least not on the 700 MHz band, and there is no other spectrum that is available statewide.

According to the two representatives, the Department of Defense has also taken back the 137-143 MHz military spectrum as part of the latest appropriations bills in Congress. The DOD is concerned about communications needs in the face of possible domestic terrorism and is not going to release this spectrum for state and local public safety communications use. (We assume that the Wisconsin digital system operating in this band will be grandfathered.)

As of the date of the meeting, three New York counties had expressed strong interest in joining the statewide system should it ever go online. This is a common trend nationally where local and state agencies who no longer wish to bear the burden of building and maintaining a radio system piggyback on a county or state system in their area (or even a trunked business system). The New York Department of Transportation is also a focal point of NYSWCN as their antiquated low-band radio network is ripe for replacement.

New York state is interested at this time in 25 kHz, 4-slot TDMA (Time Division Multiple Access) technology for their proposed 700

MHz system. Does this mean scannists should start thinking about alternative uses for their beloved radios which don't even cover 700 MHz, much less handle such advanced radio technology?

Not at all. Look at the hurdles that must first be overcome: coming to an agreement with the Canadians, waiting for the band to be vacated by local broadcasters, finding a manufacturer to build equipment, developing a master plan and finding enough users to populate the system – and that's just for starters. Considering the huge number of New York counties that have yet to express interest and the fact that counties such as Nassau and Suffolk have recently installed their own system, a statewide, digital, New York system (as admirable a concept as it may be) is not something over which anyone should lose sleep.

You can learn more about the NYSWCN system at **www.nyswcn.state.ny.us.**

## Trunking Update

Joe passed on the following updates to the Washington County, Oregon, trunked radio system which was then posted on the **www.trunktracker.com** web site.

11600 Special Events 1
11632 Special Events 2
11664 Special Events 3
25264 Portland Int'l Airport Ground Transportation
27824 Tri-Met Rail Maintenance West
27856 Tri-Met Bus Tac 3
27888 Tri-Met ICS
27920 Tri-Met Bus Maintenance
27952 Tri-Met Customer Service
27984 Tri-Met Rail Maintenance North
28016 Tri-Met Rail Tunnel
28048 Tri-Met Rail West Portal
28080 Tri-Met Fare Supervisors
28112 Tri-Met Fare Inspection
28144 Tri-Met Rail Maintenance East
28176 Tri-Met Rail Elmonica Yard
28208 Tri-Met Rail Main 1 (Eastside Trains)
28240 Tri-Met Rail Main 2 (Westside Trains)
28272 Tri-Met Rail Main 3 (Admin)
28304 Tri-Met Rail Ruby Junction Yard
28336 Tri-Met Rail Tac 1
28368 Tri-Met Rail Tac 2
28400 Tri-Met Rail Security
28432 Tri-Met Bus Dispatch
28464 Tri-Met Security
28496 Tri-Met Bus Tac 2
30704 Portland Police Bureau NE Tac 3
60208 is NOT carried on the Multnomah County trunk system, but IS on the Washington County system.

## Maine Scanning

During the APCO meeting in Maine I put together the following list of frequencies for the "mainiac" in all of us. (Note that portions were provided by a local electronics store and are not verified. Contributions and corrections would be appreciated.)

**Local Police and Fire**

| | |
|---|---|
| Auburn Police | 159.150 |
| Auburn Fire | 154.370 |
| Berwick Police | 154.770 |
| Berwick Fire | 154.190 |
| Biddeford Police | 156.210 |
| Biddeford Fire | 154.250 |
| Brunswick Police | 155.370 |
| Brunswick Fire | 154.340 |
| Cape Elizabeth Police | 155.145 |
| Cape Elizabeth Fire | 154.025 |
| Cumberland Police | 155.625 |
| Cumberland Fire | 154.010 |
| Falmouth Police | 155.790 |
| Falmouth Fire | 154.980 |
| Freeport Police | 158.850 |
| Freeport Fire | 154.385 |
| Gorham Police | 153.875 |
| Gorham Fire | 154.400 |
| Kennebunk Police | 155.190 |
| Kennebunk Fire | 33.700 |
| Old Orchard Police | 155.010 |
| Old Orchard Fire | 154.250 |
| Raymond Police | 155.625 |
| Raymond Fire | 154.445 |
| Saco Police | 155.055 |
| Saco Fire | 154.250 |
| Sanford Police | 155.310 |
| Sanford Fire | 33.860 |
| Scarborough Police | 155.415 |
| Scarborough Fire | 154.130 |
| South Portland Police | 155.610 (runs digital mode part time) |
| South Portland Fire | 154.430 |
| Topsham Police | 156.210 |
| Topsham Fire | 153.980 |
| Wells Police | 154.770 |
| Wells Fire | 33.700 |
| Westbrook Police | 155.130 |
| Westbrook Fire | 154.370 |
| Windham Police | 155.835 |
| Windham Fire | 154.220 |
| Yarmouth Police | 154.965 |
| Yarmouth Fire | 154.160 |
| York Police | 155.640 |
| York Fire | 33.700 |

**Maine State Police**

| | |
|---|---|
| Region 1 (Gray) | 154.665 |
| Region 2 (Augusta) | 154.650 |
| Region 3 (Orono) | 154.905 |
| Statewide | 154.695 |
| Maine Turnpike Police | |

**Sheriffs**

| | |
|---|---|
| Androscoggin County | 155.670 |
| Cumberland County | 155.625 |
| Lincoln County | 154.890 |
| Oxford County | 155.070 |
| Sagadahoc County | 154.815 |
| York County | 154.995 |

**Miscellaneous**

| | |
|---|---|
| Portland Area Transit | 453.875 |
| State Fire | 154.310 |
| Maine Ambulance | 155.325 |

**Maine Turnpike**

| | |
|---|---|
| State Police | 156.045 |
| Snowplows | 151.130 |
| Administration | 151.070 |

**Railroads**

| | |
|---|---|
| Maine Central | 160.380 |
| | 160.620 |
| Boston & Maine | 161.160 |
| Bangor & Aroostook | 160.920 |

**Marine**

| | |
|---|---|
| Safety Vessels | 156.300 |
| Tugboats | 156.350 |
| Casco Bay Lines | 156.500 |
| Pilot Boats | 156.550 |
| Navigation | 156.600 |
| Secondary Tug | 156.650 |
| Search & Rescue | 156.950 |
| Coast Guard | 157.050 |
| | 157.150 |
| Waterfront | 48.180 |

**Aircraft**

| | |
|---|---|
| Portland Unicom | 123.500 |
| | 119.750 |
| Portland Clearance | 121.700 |
| Portland Approach | 125.600 |
| Portland Tower | 120.900 |
| Portland ATIS | 119.050 |
| Ground Control | 121.900 |
| Federal Express | 131.925 |

**City of Portland**

Motorola Type II trunked system
866.0625, 866.2875, 866.3125, 866.5625, 866.7875, 867.2875, 867.7875, 868.2875, 868.6375, 868.7875

# Scanner Logs

SCANNING REPORT

**Larry Van Horn**
larry@grove-ent.com

Welcome to the premier edition of *MT*'s *Scanner Logs* column. We have had a lot of requests from *MT* readers to include a section of the magazine where they can share what they are hearing on the scanner bands with the rest of the radio scanner community, like the ute and shortwave folks do. So here is your chance with *Scanner Logs*.

You can submit your intercepts, skip reports and system frequency information to us via Scanner Logs, P.O. Box 98, Brasstown, NC 28902-0198 or via email to *larry@grove-ent.com*.

To start things off this month, here are a few of the VHF low band intercepts I have recently received here in **Brasstown, NC**, using an Icom R-8500.

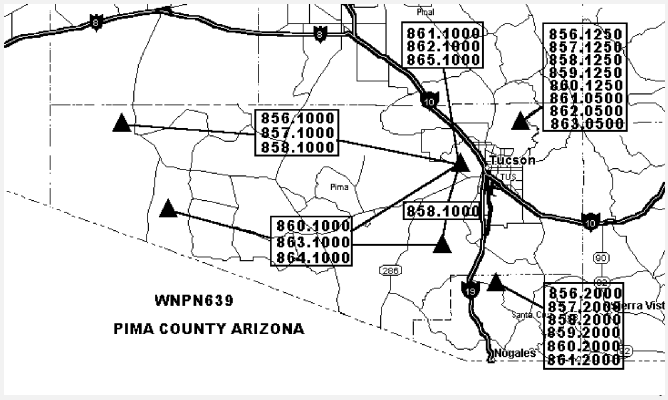
| MHz | EST | |
|---|---|---|
| 30.040 | 2100 | US Fish and Wildlife, Arcata, CA. NFM English traffic |
| 31.060 | 1912 | Unknown agency, Ensenada, BC Mexico. NFM Spanish male |
| 31.300 | 1355 | Paging System, Unknown location. NFM Digital Paging |
| 31.480 | 1510 | Marine Dispatch, Harvey, LA. NFM English male, Cajun accented fisherman mentioned locations in Louisiana. |
| 33.800 | 1856 | KRG737 Fire Dispatch, Ashford, CT. NFM Male dispatcher with fire call/ID |
| 33.820 | 1926 | KCE457 Fire Dispatch , Newtown, CT. NFM Male dispatcher with fire call/ID |
| 33.900 | 2000 | WNVZ775 Fire Dispatch, Woodstock, CT. NFM Male dispatcher/CW ID |
| | 2013 | KDN950 Fire Dispatch, Lyndhurst, NJ. NFM Fire call for Lyndhurst Township by female dispatcher |
| 33.960 | 2005 | KEI615 Fire Dispatch, Mount Kisco, NY. NFM Male dispatcher with fire call/ID |
| 34.420 | 1630 | Unknown agency, Unknown, Canada. NFM Definite Canadian transmitter (100.0 Hz PL tone) |
| 35.120 | 1806 | Unknown agency, Unknown location. NFM English male dispatcher (146.2 Hz PL tone) |
| 35.160 | 2055 | KGZ495 Standard Telephone Co, Dahlonega, GA. NFM Female dispatcher |
| 35.180 | 2032 | WPLH978 Vernola Towing, Norwalk, CA. NFM Male dispatcher (PST), tow truck dispatching, mentioned call for New Life Church (162.2 Hz PL tone) |
| 35.340 | 1647 | KNKI943 Voice Pager, St. Croix, VI. NFM Voice pager system, people IDing themselves on St. Croix. |
| 35.540 | 2256 | Paging System, Unknown location. NFM Voice pager system (COR) |
| 35.550 | 1955 | Unknown agency, Unknown location. NFM Weak DTMF tones heard here |
| 35.620 | 2000 | Deutsche Welle, Antigua. AM Second harmonic of 17.810 MHz broadcast with German language program |
| 35.680 | 1816 | Paging System, Unknown location. NFM Digital paging |
| 35.720 | 2243 | WXA485 Cox Comm, Mission Viejo, CA. NFM Female dispatcher, cable company dispatch-traffic on Mission Vallejo pay per view problem (88.5 Hz PL tone) |
| 35.800 | 1809 | KEN700 Chevreaux Concrete Inc, Auburn, CA. NFM Male dispatcher, gravel/concrete business (94.8 Hz PL tone) |
| 35.960 | 1747 | Tow Truck Dispatch, Unknown location. NFM Female tow truck dispatcher mentioned Waverly |
| 35.980 | 1742 | KNFT265 Superior Ready Mix LP, Various, CA. NFM Male dispatcher about loads |
| | 1744 | WNSN407 Hadley Tow Co, Whittier, CA. NFM Female dispatcher (82.5 Hz PL tone) |
| 35.980 | 1818 | KBE757 Ray May Plumbing Co, Montclair, CA. NFM Female dispatcher |
| 36.050 | 2113 | Department of Energy, Nevada Test Site, NV. NFM Male dispatcher talking about building heat |
| 37.120 | 1953 | Unknown agency, Unknown location. NFM Packet tone data burst |
| 37.980 | 2258 | Unknown agency, Unknown location. NFM Packet type data burst with weird ear piercing tones |
| 39.140 | 2200 | WPGY499 California Highway Patrol Dispatch, San Diego, CA. NFM Female dispatcher <Blue 1> (162.2 Hz PL tone) |
| 39.260 | 2157 | Law Enforcement, Unknown location. NFM Female dispatcher (118.8 Hz PL tone) |
| 39.400 | 2030 | Unknown agency, Unknown location. NFM Sweeping tone with microphonics, heard keyups underneath. |
| 39.600 | 1848 | WPHM438 California Highway Patrol Dispatch, San Diego, CA. NFM Female dispatcher repeater output (input 42.200) <Gold> |
| 39.760 | 2100 | KYG736 Nevada County Sheriff dispatch, Nevada City, CA. NFM Male dispatch <F-1 West>, noted several Paul## units working dispatcher |
| 39.800 | 1834 | WPHM449 California Highway Patrol Dispatch, San Diego, CA. NFM Female dispatcher repeater output (input 42.840) <Tan> (162.2 Hz PL tone) |
| 42.420 | 1901 | WNHH691 Tennessee Highway Patrol Dispatch, Chattanooga, TN. NFM THP dispatch <Channel 1> (114.8 Hz PL tone) |
| 42.440 | 2045 | KMA962 California Highway Patrol Dispatch, San Francisco, CA. NFM CHP dispatch <Pink> (131.8 Hz PL tone) |
| 42.500 | 2035 | KIA377 North Carolina Highway Patrol Dispatch, Asheville, NC. NFM NCHP dispatch (173.8 Hz PL tone) |
| 42.560 | 1936 | KGJ637 Tennessee Highway Patrol Dispatch, Knoxville, TN. NFM THP dispatch <Channel 3> (107.2 Hz PL tone) |
| 42.700 | 0936 | KA4407 North Carolina Highway Patrol Mobiles, Western, NC. NFM NCHP mobiles noted here duplex with 42.500 MHz |
| 43.020 | 1921 | KTY738 Youngblood Trucking/Ready Mix, Young Harris, GA. NFM Simplex dispatch (COR) |
| 43.400 | 1910 | WPLR335 Tows Sewer Foster Construction, Blue Ridge, GA. NFM Simplex dispatch |
| 47.740 | 1559 | KIA769 North Georgia Electric Coop, Dalton, GA. NFM Female dispatcher ID as 769 |

## Frequency Potluck

Steve Robeson in Dunlap, Tennessee, via the Chattradio newsgroup on **onelist.com,** reports 151.625 is used by the United States Hang Gliding Association, along with 151.925 for air-to-air and air-to-ground communications by its members.

Also via the Chattradio group, Matthew Sadler reports Chattanooga Fox News 61 has a license pending on 450.0925. He doesn't have any PL/DPL tone information yet but that is coming.

Terence Brennan sends along a map of the Pima County, Arizona, EDACS trunking system. This maps shows the frequency assignments and tower locations for WNPN639 in Pima County. Terence says there may be up to six systems, but it is impossible to be sure from outside the area. Some of the assignments are to individual towers, and others are shared between several towers. If anyone is having any success in monitoring this EDACS system with the new trunk trackers we would like to hear from you and I will pass it along to Terence.




Now it is your turn. Let's see those frequency lists, systems maps, VHF-low band intercepts, and more!

**Hugh Stegman, NV6H**
utilityworld@ominous-valve.com
www.ominous-valve.com/uteworld.html

# Solar Peak Skip: The High End is Back!

When I was a kid, just the merest slip of a radio nerd in Los Angeles, I didn't understand why they put frequencies above 25 megahertz (MHz) in short wave radios. After all, there was never any good DX (distant or rare stations) there. I couldn't understand all the fuss, or believe any of the old-timer stories about worldwide CB skip on 27 MHz. Then the solar cycle changed.

Before long, I had been educated. I knew what the old-timers knew, that 25 to 30 (or 50, for that matter) MHz frequencies may not always be open, but they're the prime DX bands when they are. Signals are clearer, with less multipath distortion, and skip is so efficient that ten-watt utilities can cover half the world. Ever since, I've made very sure that all my radios work very well up there.

## Up, Up and Away

If Horace Greeley, the writer who pointed at the US map and said, "Go west, young man," were around today, he'd most likely point at his receiver and say, "Go up, young nerd." As the century turns, it's definitely time to think about the higher frequencies.

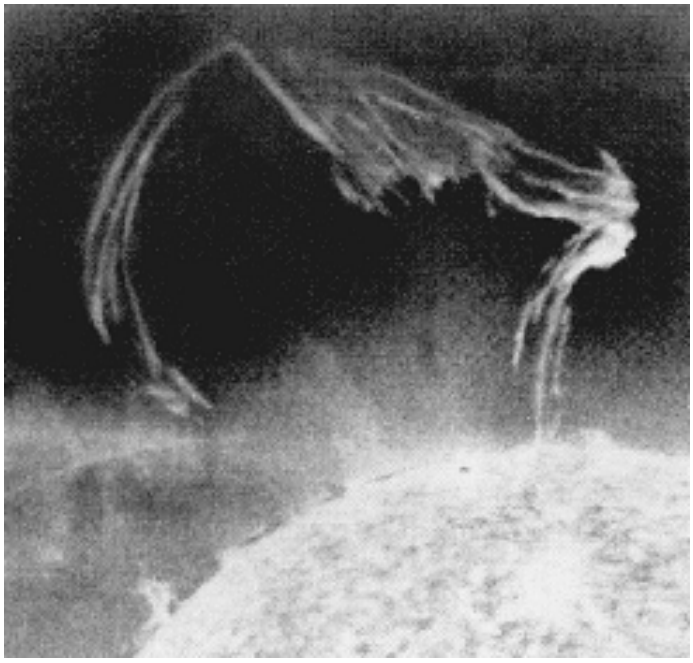
Visualize the HF utility spectrum as a window through which we can hear weak signals at great distances, and around which we hear nothing at all. The window, or more accurately the usable frequency range for good skip, moves up and down every day as the ionosphere changes under the rising or setting sun. Shortwave stations, as a result, must also move, with operators or their software changing frequency several times daily, higher in daylight, lower at night, up and down, forever.

The low end of this frequency window – the measured point where the ionosphere returns too little signal for readable skip on a particular path – is the lowest usable frequency (LUF) for that path. The high end, the top of the window, where the signals don't refract enough to come back down, is the maximum usable frequency (MUF).

DX-chasing hams, not to mention CB or scanner skip-shooters, like to work close to MUF for the signal clarity we've mentioned. Most of our HF utilities, though, kind of hang out in the upper middle, compromising efficiency for predictability. This is the frequency you'll see described in propagation predictions as FOT, optimum traffic frequency, the one expected to work on the greatest number of days in the period.

While everyone on HF quickly grows accustomed (or at least resigned) to daily frequency changes, not everyone is as ready for the longer-term effects of the eleven-year solar cycle. Some might wonder where some favorite utility has gone. Well, it's still around, but on much higher frequencies, sometimes high enough to be confused with harmonics, receiver problems, or other unwanted signals.

It gets better. Tiny maritime allocations exist at 25010-25210 and 26100-26175 kHz, and a few US military stations go even higher. Every cycle, these suddenly pop up, mystifying newcomers. Others are routinely confused when they stumble across one of the remaining US commercial broadcasters with a program audio simulcast on



25870-26470 kHz FM (frequency modulation). This is an old band, pretty much forsaken for UHF, but urban stations often take any frequency they can get. Comes the solar peak, and suddenly a 50-watt cue feed from a small AM talker has coverage more like a megawatt international broadcaster.

The really radical skip, however, comes just after sudden ionospheric disturbances. These are caused by coronal mass ejections, which can really throw energy this way. Depending on the size of the ionospheric hit, which instantly reconfigures the entire daylit side of the planet, there'll be anything from slight fades to the total loss of all HF skywave for up to an hour.

To simulate this latter effect, turn your radio off. It's that quiet, and that scary. Most atmospheric noise is skywave, and it goes away, too. The first time you hear this, you'll go outside and check your antenna. I did.

What's happened is that the LUF has gone so high it's practically out of HF. If the outage isn't total, a move to ten meters, or even low VHF, will often restore some skip, which will be unpredictable enough to give you some old-timer stories of your own. I remember some disturbed MUFs going over 60 MHz in the last cycle. I heard the distinctive sound of foreign video, with its different scan rates, on several VHF frequencies. Honest, I did.

Between such wacky events, it's time to get out the frequency books, look up those high channels that haven't been used in years, and put them into memories. It's what the US Coast Guard has been doing, with mention of "the new frequency" (15088, upper sideband, and far from new, except this solar cycle). It's what the air traffic control stations are doing, just below 22 MHz. Now, it's what we will do, too.

**Hugh Stegman**

**Abbreviations used in this column**

| | |
|---|---|
| AFB | Air Force Base |
| ALE | Automated Link Establishment |
| AM | Amplitude Modulation |
| ANDVT | Advanced Narrowband Digital Voice Terminal |
| ARQ | Automatic Repeat Request teleprinting scheme |
| AWACS | Airborne Warning And Control System |
| CAMSLANT | Communication Area Master Station, Atlantic |
| CAMSPAC | Communication Area Master Station, Pacific |
| CG | Coast Guard |
| CW | Morse code telegraphy ("Continuous Wave") |
| DEA | Drug Enforcement Agency |
| EAM | Emergency Action Message |
| FAX | Facsimile |
| FEMA | Federal Emergency Management Agency |
| GANTSEC | Greater Antilles Section |
| JSTARS | Joint Surveillance Target Attack Radar System |
| MARS | Military Affiliate Radio System |
| MFA | Ministry of Foreign Affairs |
| MWARA | Major World Air Route Area |
| Ops | Operations |
| RSA | Republic of South Africa |
| RS-ARQ | Simplex ARQ teleprinting scheme |
| RTTY | Radio Teletype |
| SAM | Special Air Mission |
| SITOR | Simplex Teleprinting Over Radio |
| UK | United Kingdom |
| Unid | Unidentified |
| US | United States |
| USAF | US Air Force |
| VIP | Very Important Person |
| VOLMET | Aviation weather observations |

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time).

2136.0 Unid-Czech station with 9-tone callup, then count from 50 to 59, at 0700. (Ary Boender-Netherlands)

2598.0 Stephensville-Canadian Coast Guard with weather in English and French, at 0215. (Ron Perron-MD)

2670.0 US Coast Guard Group Woods Hole, MA, mentioned flare sighting at 0108. CG District 1 (Boston), with New England weather at 1014. CG Woods Hole, with weather and whale protection warnings, at 1019. (Perron-MD)

2789.0 FUE-French Navy, Brest, with RTTY test tape at 2110. (Boender-Netherlands)

2815.0 IDR8-Italian Navy, Roma, RTTY bulletins at 2112. (Boender-Netherlands)

2845.0 PBB-Dutch Navy, Den Helder, RTTY bulletins at 2113. (Boender-Netherlands)

3322.0 "R"-Russian Navy CW single-letter channel marker, Ustinov, at 2108. (Boender-Netherlands)

3485.0 New York VOLMET, aviation weather at 0502. (Sue Wilden-IN)

4016.0 PV3Z-Czech Air Force, Pardubice, RTTY test tape at 2030, 2115, 2215, and 2315. (Boender-Netherlands)

4024.0 VLDR-Czech military, with 5-figure CW code groups at 2012. VLDR working J7VT, more code groups, at 2245. (Boender-Netherlands)

4214.0 IDR2-Italian Navy, Roma, RTTY bulletins at 2242. (Boender-Netherlands)

4227.0 IGJ 42-Italian Navy, Augusta, RTTY bulletins at 2242. (Boender-Netherlands)

4273.0 FUO-French Navy, Toulon, RTTY test tape at 2240. (Boender-Netherlands)

4295.0 FUE-French Navy, RTTY test tape at 2249. (Boender-Netherlands)

4426.0 NMN-US Coast Guard CAMSLANT Chesapeake, Caribbean weather and notices at 0508. (Wilden-IN)

4593.0 MKD-Royal Air Force, England, with engineering message on lowest of two multiplexed Piccolo channels, other one encrypted, at 0158. (Mike Chace-USA)

4700.0 BML-Possibly North Korea, despite Chinese-sounding callsign, with 5-figure CW "numbers" for JVG, nightly at 1300. (Takashi Yamaguchi-Japan)

4739.0 Canadian Rescue 314-Probable Canadian Forces C-130, in search for lost hunters, given 5717 kHz secondary and 4166.9 alternate, at 0001. (Perron-MD)

5164.5 "Camp"-Only identifier heard in traffic, at 0308. (Jerry Brookman-AK) *Red Cross? -Hugh*

5320.0 US Coast Guard Group Ft Macon, NC, telling cutter *Point Batan* that Group Charleston is on 5142.6 kHz, at 0032. (Perron-MD)

5400.0 YOG37-Bucharest Meteorological, with RTTY weather at 0029. (Boender-Netherlands)

5417.0 Unid-Spanish-language female voice with AM numbers, 2nd harmonic loud on 10834, at 0700. (Jay Steimel-AR)

5547.0 EVA 17-Aircraft asking San Francisco for an altitude change, at 1044. (Brookman-AK)

5574.0 United 62-Airliner with position for San Francisco at 1035. (Brookman-AK)

5643.0 Qantas 154-Airliner with position for New Zealand Radio at 1448. (Brookman-AK)

5667.0 American 154-Airliner with position for San Francisco at 1034. (Brookman-AK)

5673.0 Beijing-Beijing VOLMET, China, aviation weather at 1529. (Brookman-AK)

5696.0 Coast Guard 51A-US Coast Guard H-65, telling CAMSLANT he was joining Panther 400 (Bahamas drug operations). (Perron-MD)

5717.0 Canadian Rescue 462-Canadian Forces CC-115, given 9007 secondary by Trenton, at 0906. (Perron-MD)

5811.0 Unid-CW "numbers" message 25, 5-figure groups for "451," "466," and "951." (Yamaguchi-Japan)

5841.0 US Coast Guard 63A, probably an H-65, working Panther (DEA, Bahamas), at 0015. (Perron-MD)

6224.0 Mike-Control in US Navy tracking net, working other single-letter callsigns, at 0122 (Tom Sevart-KS)

6370.0 MIW2-Mossad, Israel, with callup and no message, at 2116. (Yamaguchi-Japan)

6416.0 WLO-Mobile Radio, AL, with weather and traffic list in SITOR-B, at 0608. (Sevart-KS)

6655.0 Japan Air 401-Airliner with position for San Francisco at 1537. (Brookman-AK)

6679.0 Honolulu VOLMET, weather at 1412. Tokyo VOLMET, with aviation weather at 1555. (Brookman-AK)

6693.0 Claw 12-US Navy P-3C, working Rock Bottom (Rota, Spain) at 0409. (Perron-MD)

6694.0 Canadian Rescue 314-Canadian Forces CC-130, working Halifax at 0103. (Perron-MD)

6715.0 WAR 46-US Joint Alternate Command Post, signal checks with Crossroads at 1326. (Perron-MD)

6765.0 Cut Number Station-Cuban CW "numbers" using letter substitution, at 1201. Various other hits on 6770, 6777, 6785, 6797, 6826, 6855, 6867, 6933, 6981, 7889, all at 1200 or 1300. (Camillo Castillo-Panama)

6815.6 GANTSEC-US Coast Guard Greater Antilles Section, clear and ANDVT at 0012. Shark 07- US Coast Guard, clear and ANDVT with aircraft at 2321. (Perron-MD)

6895.4 Unid-Automated CW station, probably Russian air defense, with hours of 14-character messages nightly (local time), first discovered at 0617. (Hugh Stegman-CA)

7644.2 RFQP-French Forces, Djibouti, with ARQ "controle de voie" message at 0258. (Chace-USA)

8071.7 HEC-Berne Radio, Switzerland, with SITOR-B traffic list at 0002. (Chace-USA)

8122.0 Darwin Control-Royal Australian Navy, working vessel "9-C-3" at 1004. (Perron-MD)

8152.0 Several unid stations using names, no callsigns, shooting the breeze at 0016. (Wilden-IN) *Marine coastal simplex chatter -Hugh*

8300.0 New Star Radio Station-Taiwanese intelligence, with AM Chinese female "numbers" voice at 1230. (Sevart-KS)

8335.0 DHJ59-German Navy, Wilhemshaven, in voice and RTTY checks with vessel FGS *Rottweil*, a mine hunter, at 0425. (Perron-MD)

8435.0 XSQ-Guangzhou Radio, China, with ARQ traffic for vessel at 1019. (Eddy Waters-Australia)

8499.7 RBSL-Bombay, India, with 4-letter RTTY code groups to "39 Zero Papa 5699 3255," at 1656. (Bob Hall-RSA)

## Utility Logs (continued)

8849.0 Beijing Volmet-Beijing air radio, China, with aviation weather in accented English and a distorted signal, at 0330. (Yamaguchi-Japan)

8891.0 Unid air traffic control, probably Shanwick from accent, working airliners at 2353. (Wilden-IN)

8957.0 Medan Control, Indonesia, calling a Malaysian Air flight at 1020. (Waters-Australia)

8971.0 Fighting Tiger 730-US Navy P-3C, anti-drug net with Headwaiter Tango, Fiddle (Jacksonville, FL), and Golden Hawk (Brunswick Naval Air Station), at 2143. "7-W-Z"-Probable Dutch Navy P-3, traffic at 2210. Cardfile 71D-US Navy P-3C, working Fiddle at 2238. (Perron-MD)

8974.0 Air Force Darwin-Royal Australian Air Force, in radio checks with Australian Army East Timor, at 1032. (Perron-MD)

8975.0 Cuban "Atencion" AM Spanish "numbers," splattering over 6 kHz at 1007. (Perron-MD)

8980.0 Rescue 6026-US Coast Guard H-60, patch to CG District 5 via CAMSLANT at 1805. (Perron-MD)

8992.0 FAP Lisboa-Portuguese Air Force, radio check with unid ground station at 2027. Circus Vert-French Air Force, Villacoublay, working aircraft in French, at 2219. Navy LU 131-US Navy P-3C, patching Norfolk Ops via Croughton, at 2317. (Perron-MD)

8993.0 Max 25-Unknown aircraft, called Mainsail (general call) "on 8993" with no response, at 0124.(Perron-MD) *Air Force Global moved to 8992 6 years ago. Oops. -Hugh*

9016.0 Newscast, in signal check with WAR 46, US Joint Alternate Command Post, at 0259. (Jeff Haverlah-TX)

10051.0 New York VOLMET, aviation weather at 2301. (Wilden-IN)

10177.7 RFFA-French Ministry of Defense, Paris, with ARQ idler at 0752. (Waters-Australia)

10253.5 Unknown UK military or MFA, with Piccolo idler at 1217. (Waters-Australia)

10261.5 London-UK diplomatic with Piccolo messages at 0557. (Waters-Australia)

10493.0 WGY 908-FEMA, CO, and WGY 912, FEMA, Berryville, VA, activating National Emergency Communications Net for hurricane, also heard WGY 904 (GA), WGY 914 (GA), "WGY 914 Mobile," and several MARS stations, at 1827. (Steimel-AR)

10780.0 Razor 66-US Air Force E-8C JSTARS surveillance aircraft, with several patches via Cape Radio, FL, to Raymond 19, Robins AFB, at 1313. (Allan Stern-FL) "922"-Unknown aircraft working Ascension Global, not Cape Radio, at 2317. (Perron-MD)

10820.0 VLB-Mossad, Israel, with abnormal identifier "VLB18P46B55," also on 12747 and 14866 at 2100. VLB2, next day at 2100. (Yamaguchi-Japan)

10972.0 Unid-Chinese speaking male, live voice, reading coded message in 4-number groups to unheard station, at 1247. (Gary Cohen-China)

11175.0 NRN 364-Dutch Navy P-3, reporting departure in patch via Hickam at 1110. (Perron-MD) Andrews-US Air Force, in patch with uncopyable hurricane aircraft for a Cable News Network interview, at 2024. (Steimel-AR) Andrews with EAM, at 2240. (Wilden-IN)

11178.0 Charlie 2-Dutch Navy vessel with position for PJC, at 2347. (Perron-MD)

11220.0 Spar 566-US Air Force VIP flight, in radio check with Andrews AFB "Mystic Star" on frequency Foxtrot-311, secondary of F-5 (9120), at 1845. (Kevin O'Rourke-MO) SAM 206-US Air Force VIP flight carrying Secretary of State, in patch via Andrews to State Department Ops Center, enroute to New York, at 2055. (Perron-MD)

11232.0 Darkstar Mike - E-3B AWACS, setting up satellite comm to Okie Sam in patch via Trenton, at 1325. UN 399-Canadian Forces aircraft on United Nations mission, working Trenton at 2050. (Perron-MD)

11300.0 Sanaa Control, Yemen, working an Air France flight at 2147. (Waters-Australia)

11400.0 "8-Y-Y"-Unknown joint anti-smuggling with coded secure frequency for "Sierra Hotel Tango" at 0122. 8-Y-Y telling H-7-Y of no joy on frequency "secret 070B," at 0127. (Perron-MD)

12475.0 "K6"-Unknown station with 5-number CW "cut" groups for ZJ (not heard and probably on another frequency), using 1-0 substitutes AU34567DNT, at 1456. (Sevart-KS)

12747.0 VLB-Mossad, Israel, with abnormal identifier "VLB18P46B55," also on 10280 and 14866, at 2100. Next day repeated "VLB15P36L44F1666," also at 2100. (Yamaguchi-Japan)

13089.0 CAMSLANT-US Coast Guard master station, VA, calling cutter *Gentian* with no joy, at 2112. (Perron-MD)

13282.0 Hong Kong Radio-Computer synthesized voice with aviation weather for Asian locations, at 2030. (Cohen-China)

14686.0 Coast Guard 1718-US Coast Guard HC-130, working Atlas (DEA/Collins contract comm center), at 2237. (Perron-MD)

14731.7 RFVI-French Forces, Le Port, Reunion, with ARQ "controle de voie" message to RFFA, Paris, at 1040. (Waters-Australia)

14842.5 JMS-Russian MFA/FAPSI, with RTTY message in 5-figure code groups at 2230. (Sevart-KS)

14844.7 RFVITT-French Forces, Dzaoudzi, with coded ARQ message to RFVI Reunion, at 1047. (Waters-Australia)

14931.0 8BY-French intelligence, Paris, with callup and 3-number groups at 1001. (Chace-USA)

15955.1 Many ALE bursts from different stations, probably US Federal Bureau of Investigation, started at 1251. (Chace-USA)

16279.0 7RQ20-Algerian MFA, Cairo, with COQ8-26 chatter and Arabic traffic to Algiers, followed by Algiers with "Bulletin d'Information" in French, at 1640. (Hall-RSA)

16279.0 MAE Algiers-Algerian MFA, with COQ8-26 "Bulletin d'Information" in French, at 1635. (Hall-RSA)

16328.5 Zaire Bank Circuit-African financial transaction network, with ARQ at 1315. (Hall-RSA)

16386.7 Foreign Islamabad-Turkish MFA, with many ARQ pages of 5-letter code groups, at 1605. (Hall-RSA)

16873.0 "O"-possible CW identifier in over-the-horizon radar bursts, at 2110. (Sevart-KS) *Yes, the buzz saw is back. –Hugh*

17499.0 Cherry Ripe-British intelligence, Guam, with 5-figure "numbers," in English female voice, at 1201, another day at 1202. (Castillo-Panama)

17973.0 Newscast calling several stations at 0040. Normandy entering net with Reassign and Mandrill, set this frequency (Z255) as primary, at 1617. (Haverlah-TX)

18018.0 Architect-Royal Air Force, UK, with airfield weather observations at 1302. (Perron-MD)

18172.6 Unid ALE burst, probably US Federal Bureau of Investigation, at 1915. (Chace-USA)

18993.5 SPW-Warsaw Radio, Poland, with SITOR-B traffic list at 1859. (Chace-USA)

19131.0 Atlas-DEA/Collins, IA, with aircraft leaving Sundance 700 for Sundance 725 (both in Peru), at 1243. "3-2-C"-US Coast Guard, reporting departure from Panther (DEA, Bahamas) to Atlas at 1612. Atlas working Longhorn (DEA aircraft) at 1731, then Hard Rock at 1755. Atlas working Flint 930, also over Peru, at 2109. (Perron-MD)

19715.0 VSG-Unknown hand-sent CW, trying to change frequency at 1015. (Yamaguchi-Japan)

20197.7 RFFA-French Ministry of Defense, Paris, with 5-letter ARQ code groups at 1650. (Hall-RSA)

20474.0 Cherry Ripe-British Intelligence, Guam, malfunctioning with test tone until 1017, then joined 1000 "numbers" in progress, sounded fine on the 23461 parallel. Really rare for these guys to mess up. (Yamaguchi-Japan)

20551.6 CEN-Romanian MFA, Bucharest, with ALE burst at 1334. (Chace-USA)

20632.6 Several USAF stations, with ALE bursts at 2101 (Croughton) and 2102 (Elmendorf, PR, Thule). (Chace-USA)

20740.0 VLB-Mossad, Israel, first time this frequency, with 30 minutes of the abnormal phonetic identifier "VLB18P16R56F46," at 1230. (Yamaguchi-Japan)

20986.8 SAM-Swedish MFA, Stockholm, with 5-letter group ARQ message for Dar Es Salaam, at 1539. (Chace-USA)

21925.0 San Francisco Radio, with air traffic instructions at 0358. (Brookman-Alaska) *East Pacific air route net, not heard this high in 5 years. -Hugh*

22442.0 XSV- Tianjin Radio, China, with CW marker at 0420. (Waters-Australia)

22865.0 PSN-Russian MFA/FAPSI, with 5-letter RTTY code groups at 2240. Repeated same message on 19921 kHz RTTY at 2311. (Sevart-KS)

22912.6 RFVI-French Forces, Le Port, with ARQ idler at 1135. (Hall-RSA)

23331.5 KVM70-Honolulu Radio, HI, with weather FAX at 0155. (Waters-Australia)

23338.6 Several USAF stations, with ALE bursts at 1731 (Dallas Scope Command), and 1732 (Andrews, Thule and PR). (Chace-USA)

23373.0 Italian MFA, Rome, with ARQ traffic at 1340, again at 1430. (Hall-RSA)

26105.0 KEJ-Hoolehua Radio, HI, CW marker at 0422. (Waters-Australia) *Maritime channel #2509 -Hugh*

27871.6 Several USAF stations, with ALE bursts at 1632 (Hickam), 1634 (PR), 1657 (Diego Garcia), and 1658 (Offutt). (Chace-USA)

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# Digital Beginner's Frequencies

Newly interested in decoding digital signals on HF radio? Perhaps you've been fortunate enough to receive a new radio or decoder for the holidays and are looking for something tried and tested with which to check out your new equipment? If so, you've turned to the right page!

We thought the start of a new century was a good place to revisit some old favorites, and provide the beginner with reliable and interesting catches, some practice in tuning that new gear, and learning some new places to listen in the meantime. Most of the frequencies we give should be reliable for most of the US and Europe, so here goes...

## Press Stations

Long a mainstay of the digital listener new and old, the past few years has seen the flight of most HF press stations to the world of satellite communications. However, a few cling tenaciously to shortwave, and are a welcome sound when you come across them:

**HMF** transmits the official North Korean news via their KCNA agency from Pyongyang, and is a frequent visitor to our logbooks in the early mornings here in the US.
Frequencies: 10580, 11476, 11536, 13580, 14452, 14567 and 15633 kHz
Settings: 50 bd Baudot RTTY with a shift of 250 or 400 Hz

## Meteo and Air Stations

Also suffering from a general demise, some weather stations continue to send reports of the meteorological conditions at various cities and airports around the world. Features such as the "SYNOP" decoder (the "W" key in the Baudot RTTY and other modules) built into the Hoka-series of decoders makes listening to these stations a real pleasure, with automatic decoding of the five figure AAXX and BBXX, and METAR meteo codes into human-readable text. Many of these stations regularly send a test tape containing their frequencies and operating schedule, so it's worth capturing text to disk and reviewing it for later analysis.

**HZN** covers the Arabian peninsula from its facilities in Jeddah, Saudi Arabia. Its signal can be rather distorted at times, but copy is still reliable across a number of frequencies by day and by night.
Frequencies: 7625.1, 10215.1, 11125.0 and 23370.0 kHz
Settings: 100 bd Baudot RTTY with 850 Hz shift

**DDK** and **DDH** are the callsigns used by the German Meteorological Service's transmissions from near Hamburg.
Frequencies: 7646, 10100.8, 11039, 11638 and 14467.3 kHz
Settings: 50 bd Baudot RTTY with 400 Hz shift

**5YE** and **5YD** cover eastern Africa from Nairobi, Kenya.
Frequencies: 9041 and 17441.6 kHz
Settings: 50 bd with 400 Hz shift and 100 bd with 850 Hz shift

## Intelligence Stations

The Cold War is said to be over, the Berlin Wall fell a decade ago, and some said that they would soon die, but the Intelligence "numbers" stations continue to flourish by voice, CW and other digital modes. These stations still make for fascinating listening, and there are plenty of mysteries still to be cracked.

**8BY** is the fictitious callsign generally acknowledged to be used by French Intelligence, transmitting from a facility just outside Paris. The callsign, were it to conform with ITU rules, would place it in Indonesia, but this one's been sending strange groups of three figure codes separated by slashes each hour and half-hour for some years now. To this day, no one really knows its purpose.
Frequencies: 7668, 10248, 12075, 14931, 18415 and 20946 kHz
Settings: CW (Morse)

The FAPSI (aka SOUD or Brotherhood) stations have migrated from CW, to Baudot RTTY, and now also make use of the Russian MFSK mode CROWD-36 (see October 1999's *Digital Digest*). These stations use three letter callsigns (**KRN**, and **SPK** to name two of the common ones), make use of the characteristically Russian tone shift of 500 Hz when using RTTY, and have an unusual tuning test tape of "646464646464" instead of the more typical "RYRYRYRY". The frequency list of these interestiing stations could easily consume two of our columns, so here is a selection of recently monitored frequencies:
Frequencies: 13452 (2230 UTC) 14434 (1800 UTC) 14843 (2230 UTC) 17412 (1530 UTC) 18169 (1800 UTC)
Settings: 75 bd Baudot RTTY with 500 Hz shift

## Maritime Stations

The many coast stations throughout the world, together with the world's navies take up a considerable part of the HF spectrum. Here you can hear telexes from ships to shore, weather, sea conditions, new relayed to crews at sea, e-mail and some interesting navy transmissions.

Perhaps the largest of the maritime networks is that of Globe Wireless (**http://www.globewireless.com**) which recently merged with Marinet to form the Full Service Marine Communications Company with many powerful coast stations in a cooperating network that covers the majority of the world's seas.

Transmissions use standard 100 bd SITOR-A (ARQ) and 100 bd SITOR-B (FEC) to convey a variety of data including ship-to-shore messages, shipping (traffic) lists, and weather forecasts for the high seas. Here are some current callsigns and frequencies:

**LFI** Rogaland Radio, Norway
Frequencies: 6467, 12678

**A9M** Bahrain Radio
Frequencies: 4219, 12756.5

**ZSC** Capetown Radio, South Africa
Frequencies: 8431.5, 16816

**WCC** Chatham Radio, USA
Frequencies: 8426.5, 12589.5, 16817

**KPH** San Francisco Radio, USA
Frequencies: 16817.5, 16825

**KFS** San Francisco Radio, USA
Frequencies: 8526.5, 16829.5

**8PO** Barbados Radio
Frequencies: 6330.5, 16841.5

**4XZ** is the Israeli Navy's station at Haifa. Long suspected of being a numbers station, some careful monitoring by various listeners finally attributed many of the strange five number group transmissions to an obscure international meteorological surface analysis code. When idle, the station sends the familiar CW marking sequence of "VVV DE 4XZ 4XZ 4XZ BT BT". 4XZ can be heard on a multitude of frequencies simultaneously, around the clock and makes an excellent propagation indicator.
Frequencies: 10046, 10355, 12984, 14648, 18481 kHz
Settings: CW (Morse)

**MGJ** and **MTO**, the Royal Navy's stations, the French Navy ports around the world, and many other NATO Navy stations can be heard sending a constant CARB (Channel Availability Broadcast) message. These odd-looking transmissions are used by ships wishing to place calls to the shore station because they show which of a number of assigned channels is in use. Catch these while you can though, as many will soon be transitioning to more modern 2400 bd STANAG4285 PSK modems.

**MGJ**, RN Faslane
Frequencies: 9130, 17055 and 19860 kHz
Settings: 75 bd Baudot RTTY with 340 Hz shift

**RFFME**, French Navy La Regine
Frequencies: 12666.5 and 17180 kHz
Settings: 75 bd Baudot RTTY with 850 Hz shift

Next month we'll finish up with electronic mail modes and the French Forces. Happy New Year and good (digital) DX.

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# All Is Not Well at Voice of America

Scandals have hit VOA/IBB just as a reorganization was supposedly making it "independent." Little of this has appeared in the mainstream press.

A petition was signed by more than 40 members of the VOA newsroom staff aimed at ousting the current director of news and others. Management has attempted to eliminate the remaining members of the VOA correspondent corps (including one of its most senior members now in Brussels), while stepping up outside hiring of independents.

Even under the respected new director Sanford Ungar the story at VOA is downsizing, the slow deterioration of the Foreign Service correspondent corps through attrition, unfair labor practices, and downright ugly personnel moves, plus the added controversy over IBB efforts to develop television, according to a disgruntled employee who contacted us anonymously, and who believes many people could be out of a job.

The head of one of VOA's regional service divisions, in a memo to Ungar said: "I heard you mention 'language service' cuts several dozen times. There is a widely-held perception that the language services – a majority of VOA's staff resources – have always been treated as second-class citizens with pay grade structures lower than other VOA elements, and that when money is tight, it is the language services who continually absorb the bulk of the budget cuts."

VOA is now supposed to be independent, but still has its salaries being handled by the State Department, still has a remaining (albeit small) group of foreign correspondents who are formally part of the U.S. foreign service, and now is telling listeners not to write to U.S. embassies/consulates, but will still use those same diplomatic facilities to forward (by diplomatic pouch) mail to VOA.

The biggest story possibly in years – Sanford Ungar announced in a meeting with service chiefs and division directors on Oct 22 that the Congressional budget situation looked bad. The figure for VOA reported out of the House-Senate conference committee matched the House of Representatives figure of $105.7 million – which still left VOA 7-8 million dollars short. Congress is telling VOA to swallow cost of living increases and so, Ungar announced, VOA faces sharp cuts.

A November 18 Town Hall meeting with VOA/IBB staff members showed how fragile VOA is. The President vetoed, as was hoped, a spending bill that threatened to truly gut VOA. However, there remained a 4.5 million dollar shortfall, plus VOA has to absorb cost of living increases approved by the White House. The budget was already stretched to its limit; $4.5 million is the thread upon which the jobs of many at VOA will hang. Ungar emphasized that while VOA has permission to apply for this money, reprogrammed from the State Department, there is no guarantee it would come to VOA.

There are likely to be RIFS (layoffs) and VOA is certainly looking at either shutting down whole language services, cutting broadcast times, turning some of the services into "feed services" (as with Thai service in the 80s) and/or letting people go. If based on seniority, VOA will ironically lose some of its youngest and most talented broadcasters and other staff. Agency officials would prefer to get rid of "old timers," because they know too much about how messed up the Agency really is.

The BBG (Broadcasting Board of Governors) is telling people that there will be a close examination beginning immediately of the effectiveness and impact of various language services and that VOA employees can now look to at least 3 years of further cuts. As with Deutsche Welle, it appears the days of VOA are truly numbered.

There has been a pattern – political appointees coming in, doing their damage to VOA's long-serving broadcasters, then splitting with another nice line on their resume.

Also speaking out, and for the record, is Gary Marco, President, American Federation of State, County and Municipal Employees, Local 1418, from a letter to the Washington *Times*:

"VOA opted, in some cases, to reduce its direct shortwave radio broadcasts to certain areas, choosing instead to place its programs on local or regional stations. Doing so put programs in the hands of non-U.S. government facilities and reduced VOA's ability to reach mass audiences across an entire region. In addition, becoming enamored of other technologies or media leaves the agency vulnerable if the fiscal resources aren't there to support both diversification and its core radio operations."

Then there is the Hartman case against VOA/USIA, a class action lawsuit which has been dragging on since 1977, in which about 1000 women allege they were victims of sexual discrimination when they were not hired at VOA. Only about eight of the cases have been settled. Marco says, "Before it's all over, the case could cost the American taxpayer over $1 billion in settlements (back pay, front pay, contributions to retirement plans, interest, attorneys' fees and court costs). If a litigant dies before her case is heard, the settlement is paid to her survivors or her estate. My understanding is that the funds for the settlement come out of an account at either the Treasury or the Justice Department. If the funds were to come out of the VOA budget for any one year, there would be no VOA, as the settlements are greater than the VOA budget. I guess that's the logic at work when a Federal agency gets itself in this kind of a situation."

A lengthy chronology of the case can be read courtesy of the original plaintiff who is no longer named Hartman at: **http://www.montanero.com/hartmanvusia/**

In a letter to The Honorable Benjamin A. Gilman, Chairman, House International Relations Committee, Gary Marco makes more points:

"In almost 20 years of observing Agency officials in action, what I have seen develop is a process of finding ways to fail:

"The Hartman class action sex discrimination case, the largest case of its kind in either the private or the public sector, costing the American taxpayer at least half a billion dollars in settlements, court costs and attorneys' fees, through procedural delays and other ways of trying to avoid admitting wrongdoing, is finding a way to fail;

"The abandonment of unrestricted shortwave transmissions to mass audiences in favor of localized programs on non-U.S. Government facilities is finding a way to fail;

"The digital TV project, as presently conceived, is finding a way to fail; The 'Public Access TV' feature is finding a way to fail."

(By the way, Kim Elliott wants to make clear that he is *not* the source of any of the above material.)

***All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; B-99=winter season, Oct-Mar; [non] = Broadcast to or for the listed country, but not necessarily originating there.***

***ANTIGUA*** You were the one who hooked me on harmonics years ago. We have been having a ball on VHF low band with the skip. Besides all the utilities, DW has been coming in on 35620 = 2 x 17810 at 2000-2100, in German (Larry Van Horn, NC)

***ARGENTINA*** New SW station: R. Ghost (Fantasma), unofficial on 1130 heard on 2nd harmonic 2260 around 0300 with slogans such as "AM Ghost 1130." Announcer Julio talked about DXing and said they had QSLed a listener in Bologna, Italy, and invited more reports on 2260 to Arias 2160, Lanús Este (1824) Provincia de Buenos Aires (Rubén Guillermo Margenet, Argentina)

***BRAZIL*** R. Educadora 6 de Agosto, Xapuri AC, 0045-0200* on 3355 ex-3255 with *Boa Noite, Acre* program (Rogildo Fontenelle Aragão, Cochabamba, Bolivia)

***CHINA*** 15070 is active! No, not BBC – it's China National Radio, heard at 1200 UT check, not yet listed anywhere (Joe Hanlon, PA, *World Of Radio - WOR*)

***COLOMBIA*** Clandestine: Voz de la Resistencia, 6261.15, audible in November in the 2200-2231* period (Brian Alexander, PA, *WOR*)

***COSTA RICA*** On very short notice at the end of October, Adventist World Radio announced that it was selling the five SW transmitters at Cahuita, and would concentrate on its growing satellite network in Latin America; the original TIASD SW transmitter in Alajuela would be moved to Unión Radio, AWR's Guatemala station, to improve its output on 5980. A "farewell broadcast" aired Nov 2 but AWR continued to broadcast through Nov 6.

AWR never released to whom the facility was being sold, perhaps out of embarrassment, since from Nov 7 Dr. Gene Scott was to be heard on ex-TIAWR frequencies such as 9725, 6150, 13750, 15460. Is it now TIDGS?
Scott already has 24h broadcasts on 4 NAm SW transmitters in Dallas, Nashville and Antigua on 8 frequencies plus SW relays in Russia/Germany.

Coincidentally, R. Martí moved to 5980 in the 0700-1200 UT period, drawing Cuban jamming which always extends beyond the necessary hours. AWR publicity continues to paint the sale of TIAWR as a great step forward for them, despite the fact that they are now essentially inaudible via Guatemala 5980. Is it a coincidence that AWR's regional director for Latin America is named Greg Scott? (gh, *WOR*)

***GERMANY*** [non] DW's English at 2100 to WAf has one frequency also designated for NAm, and 15410 is good here. Beam from Rwanda to WAf extends onward to cover NAm (gh)

***GHANA*** R. Ghana schedules: Radio One, Local Language all on 4915: M-F 0525-0915, 1200-2400; Weekend and Public Holidays 0525-2400. Radio Two, English, M-F, weekends and public holidays 0520-0915 3366, 1155-1700 6130 (via Mahendra Vaghjee, *WOR*)

***GREECE*** On Sundays only, VOG has an hour-long musical broadcast in English, *It's All Greek to Me* with George Anastakis(?) 1900-2000 on 17565, 17705 via VOA Delano and Greenville (John Babbis, MD, *Review Of International Broadcasting - RIB*) Host explained to a requestor that per ERT policy, he is not allowed to play any Greek music recorded abroad. What a shame also that the perpetually distorted satellite feed, combined with selective fading, make this a strain to listen to. English news direct to NAm now at 0300, followed by new Spanish at 0310, best on 9420 //9375, 7450, 12105 (gh)

***GUATEMALA*** See Costa Rica!

***ICELAND*** A reply from RUV to our proposal for English on SW indicates a lack of interest, even though it would be easy for them to put an FM English show on SW; see December column (Volker Willschrey, Saar)

***IRAN*** VOIRI is heard all day long in Farsi on 15084, but one night also used this for English at 0030, including an interview with a former US State Department official about the hostage crisis. At closing 0130 announced only 11970, 9795, 9022 (Joe Buch, DE, *swprograms*)

***IRELAND*** [non] RTE relay appeared on new 13725 in Oct at 1830-1900, sounds like Sackville, //Ascension 21630 (Joe Hanlon, PA) Listing from the BBC B-99 schedule by site shows: 13640 1830-1900 daily Sackville 250 kW 277 RTE NAm (via Andreas Volk via Wolfgang Bueschel)

***KASHMIR*** [non] Clandestine from PAKISTAN (presumed) to JAMMU KASHMIR (India territory): Voice of Jammu Kashmir Freedom on 5101.21 *1300-1430*. I conjecture that is former "V. of Kashmir Freedom" on 4100. Koran, Kashmir talks and revolutionary songs. IDed "*In Sedai Furiyati Jammu Kashmir...*" Opening and ending song "*al-Lah akbar*." Signal strength is strong, and no interference (Satoshi Hasebe, Japan, *Cumbre DX*)

***KURDISTAN*** Harim Radio, Voice of the Regional Government of Iraqi Kurdistan, Main Studio: Salah al-Din. Clandestine. (Kurdish: *Era Radiyo Harim, dangi hukumati harimi Kurdistani Iraqa*; Arabic: *huna idha'at iqlim kurdistan*) Was first heard in February 1997. It broadcasts via the facilities of the Kurdistan Democratic Party radio station Voice of Iraqi Kurdistan. Transmission timing and frequency is subject to change. May be one hour *earlier* in *summer*. Now 1430-1530 daily on 4085.

Voice of Iraqi Kurdistan, Salah al-Din, clandestine: (Kurdish: *era dangi kurdistana iraqiya*; Arabic: *sawt kurdistan al-iraq, sawt al-hizb al-dimuqrati al-kurdistani al-iraqi*) broadcasts in support of the Kurdistan Democratic Party (KDP) led by Mas'ud Barzani. The KDP says the radio station was established in September 1963. A service to Europe was introduced on 27th April 1995. Frequencies and times of broadcasts are subject to change. Broadcasts may be one hour earlier in summer.
Institutional Affiliations : Kurdistan Democratic Party. Languages : Arabic, Kurdish. UK Address: KDP Press Office, PO Box 7725, London SW1V 3ZD, UK. Tel: +44-171-498 2664 (UK). Fax: +44-171-498 2531 (UK). E-mail: *kdpeurope@aol.com* Web Site: **http://www.kdp.pp.se/** Daily on 4085: 0350-0400 Kurdish, 0400-0500 Arabic, 0500-0600 Kurdish, 1615-1800 Kurdish, 1800-1900 Arabic including news at 1830-1900 (BBC Monitoring)

***LIBERIA*** R. Liberia reactivated on 5100, Oct 31 into Nov 1, -2403*. English news about Liberia, local religious music, vernacular talk. IDs as Liberian Communications Network, and R. Liberia. Variety of Euro-pops, Afro-pops. English news at 2301. S/off with NA. Poor to fair but muffled audio. Not heard on Nov 5 check (Brian Alexander, PA)

ELWA, 4760: Folks here tell me that ELWA will be returning to shortwave, hopefully early in 2000. The antenna has just arrived in Monrovia. The transmitter is of SIM-design and will operate on their old frequency of 4760. It is a suitcase transmitter and has a power of 1-2 kW. No exact information on schedule yet, but broadcasts will be "prime time" mornings and evenings (Hans Johnson, (c) *Cumbre DX*)

***MALTA*** [non] V. of Mediterranean English is now: Daily except Friday 1900-2100 via Russia 7440; Sunday 0900-1000 11770 via Italy (Eugene Gebreurs, RVI *Radio World*)

***MAURITANIA*** Thomcast has a contract including a new 250 kW SW transmitter for R. Mauritania, Nouakchott (Thomcast via BDXC *Communication*)

***MAURITIUS*** *New radio station*? It has been reported in the local press that a Dutchman of Surinam origin who already runs radio stations in Holland and in Surinam has submitted a project to operate a similar station in the island. The program will be mainly in Hindustani [Hindi and Urdu] 24 hrs daily. No details have been given if it would be in FM or SW but it seems to be on SW as it cover the whole region. The negotiation with the authority is in a very advanced stage and let us hope that for the New Millennium at least Mauritius could be heard on SW! The first person to submit a similar project some 3 years ago was a Scandinavian but unfortunately never did he receive any kind of reply from the Authority (Mahendra Vaghjee, Mauritius)

***MEXICO*** XERTA, 4800: Apparently from the middle of September suspended transmissions due to economic problems. I don't know if it will come back.

R. UNAM, 9600: is still on the air with a good signal (in carrier), but the audio is very low. It is barely audible here in Mexico City. Generally on the air arouond 1600-0400 (Hector Garcia Bojorge, DF, *Cumbre DX*)

R. Educación, 6185, is providing many hours of very enjoyable programming, often very strong. For example, big band music with bilingual English, but mostly Spanish at 0430. Very regular. Encouraging listeners to call in. Slightly variable frequency (seems 10 to 20 Hz) (Volodya Salmaniw, BC, 24 October) Now that BBC is on 6135 instead.

*Encuentro DX* on R. Mil rescheduled from November: UT Sun 0000 on XEOI 1000 and XEOY 6010; then repeated on 6010 only: Fri 2330, Sat 2200, Sun 1500, 2230, Mon 0330 (Héctor García Bojorge)

***NETHERLANDS*** [non] A Dutch supermarket chain can be heard on 6045 via Merlin-UK with clues to a competition they are running. (RN*MN*) These are on Fri only, from 22 Oct to 31 Dec, 1500-1515 UT, conducted by the Albert Heijn supermarket chain. They sell a special millennium book, which includes a small fixed-frequency receiver to tune in to their broadcasts (Michiel Schaay, Holland, *BC-DX*) Excellent from Skelton on 6045, called Radio Prikkels (Radio goad) (Guido Schotmans, Belgium, *hard-core-dx*)

***NEW ZEALAND*** RNZI *Mailbox* plays September to March at 0205 UT (Adrian Sainsbury via Paul Ormandy) Refers to UT Thursday fortnightly instead of 0305 the rest of the year, on 17675 (gh)

***NIGERIA*** [non] Radio Kudirat, the pro-democracy station which had broadcast to Nigeria from shortwave transmitters in South Africa since 1996, appears to have closed. It has not been heard since the end of October. Nigerian political activist and Nobel prize-winner Prof Wole Soyinka is reported as saying in a statement issued in the United States on 1st November that Radio Kudirat would be relocating "home." Whilst the station used Sentech's shortwave transmitters in South Africa, it is believed to have prepared its programmes at studios in London (Chris Greenway, British DX Club) Was on 11560 at 1900; previous closures proved to be temporary.

***PAKISTAN*** R. Pakistan's B-99 schedule, Oct 31-Mar 26 English: 0230-0245 deleted; 1100-1104 17834.92 (API-6 250 kW 313) 21455.19 (API-5 250 kW 313); 1600-1615 11570.11, 15100.21, 17510 actually measured on 17491.68 to Gulf & ME and 15335 17719.97/17720.03 to E&SAf. K = Karachi 50 kW, others Islamabad 100/250 kW (Noël Green and measurements by Wolfgang Büschel)

***PERU*** R. San Miguel El Faique is leaving the pirate frequency 6955 free again, now using again the old 6895.5, says Nicolás Eramo (Gabriel Iván Barrera, Argentina, *Free Radio Weekly*)

Harmonic on 2620.54, R Chota, Chota, Cajamarca, at 0020. Lots of talk as if doing a remote broadcast; comunicados started around 0055, playing bits of Andean guitar mx; ID in passing 0059. 2 x nominal 1310, stronger than // 4890.14 on peaks. Nice surprise while looking for (unheard) R Caribe harmonic on 2540 as reported by Terry Kreuger (Jay Novello, NC)

NEW: 4940, Radio San Antonio, Villa Atalaya, Ucayali, Nov 1 at 0140

testing, asking for reports; belongs to Parroquia San Antonio de Padua (Rogildo Fontenelle Aragão, Cochabamba, Bolivia, *WOR*) Is licensed as OAW8A on 4940 kHz with 1 kW (Takayuki Inoue Nozaki, Japan)

***PORTUGAL*** By November, RDP was no longer 24h to Timor, and no longer on 17600, which we had heard well. Instead: 17725 at 0900-1200 and 2100-2400 with Portuguese hours sandwiching a middle one in Tetum, the latter also via Taiwan 11550 (via Bob Padula, *Electronic DX Press*)

***ROMANIA*** RRI Bucharest English B99:

0200-0300 11940 11830 11740 9690 9570 9510
0400-0500 17735 15335 11830 9570
0600-0700 11830 9530
0640-0700 15105 11775 9510 7105
0700-0800 21480 17720
1300-1400 17805 15390 15335 11940
1700-1800 15365 11940 11740 9625
2100-2200 9690 7215 7195 5955
2300-2400 11940 9690 9570 7195 (Fyodor Brazhnikov, Russia, *BC-DX*)

European Union ought to take military action against RRI transmitter site if they fail to clean it up. This has been going on for years. Now capable of ruining an entire meter band with spurs. During the 1300 English broadcast supposed to be on 11940, 15335, 15390 and 17805, found the last actually on 17806.8 while the HS relay was on 17824.9. The two interacted producing spurs around 17796, 17810.5, 17782 and a big FM blob covering 17711 to 17755 (gh)

RRI spurs also heard on 9200.2 and 9229.9 at 0438 in English //9570 with mailbag on a UT Friday. And from the Romania Aktualitati homeservice on 7215 these spurs in the 0100 hour: 6903.0, 6955.0, 7007.0, 7059.0, 7111.0, 7163.0 (Hans-Joachim Koch, Niddatal, Germany)

***RUSSIA*** GPR-2 B99 schedule shows all Radio Rossii relays are replaced by a new special program in Russian to the Caucasus region from 0300 as of Nov 10 (Mikhail Timofeyev, *BC-DX*)

Excellent signal and classic "Moscow modulation," so presumably this is a Russian government propaganda operation beaming into Chechnya, rather than something pro-Chechen beaming in the opposite direction. (Chris Greenway, BDXC)

New program definitely pro Moscow – about the Russian forces clearing Chechnya of illegal terrorist forces and bandits. At 1200 UTC it announced it is on the air 06 to 23 h (presume Moscow time, so 03 to 20 UTC) on 17, 19, 25, 41 and 51 metre bands. I found 15605 and 11635 being used in addition to parallel 17665 (Andy Goodwin, BDXC)

Here is RCS schedule (per MIDXB 137)

03.00-05.00 594 1089 5925 5935 7335
05.00-06.00 594 1089 5925 5935 15515*
06.00-07.00 594 1089 11635* 15515 17665*
07.00-11.00 594 1089 11635 15515 17665
11.00-12.00 594 1089 11635 15605* 17665
12.00-13.00 594 1089 11635 15605 17665
13.00-14.00 594 1089 7445* 15605 17665
14.00-15.00 594 1089 7340* 7445 17665
15.00-16.00 594 1089 7340 7355* 7445
16.00-18.00 594 1089 7340 7355 7445
18.00-19.00 594 1089 7305* 7355 7445
19.00-21.00 594 1089 7305 7355 7445 (Nikolai Pashkevich, Moscow, Russia)

The station has a very distinctive (and attractive) flute and drum interval signal. At 1800 I heard it on 7340, but with very strong co-channel Voice of Russia World Service in English. One interesting feature is that there is a short segment in Arabic at 1445 (possibly at other times as well). (Chris Greenway, BDXC)

One more additional relay from St. Petersburg: Radio Gardarika from Nov 12, Friday, Saturday, Sunday only 2015-2115 on 5925 non-directional, 7330 222 Please send any comments to pcd00342@mail.admiral.ru (Mikhail Timofeyev, St. Petersburg, *WOR*)

***SA'UDI ARABIA*** Terrific coordination on the Peninsula: besides Dubai, long on 21605, BSKSA joined it at the start of B-99 at 1400, sometimes with clashing Qur'an recitations! BSKSA then goes into French (gh)

***SOUTH AFRICA*** 25790, used by R. RSA in 1989/1990, tentatively Channel Africa around 0820-1030 in Afrikaans with greetings, mailbag (Willi Stengel, Germany, *A-Dx* via *BC-DX*) May have been special forces program not on schedule.

***SPAIN*** REE B-99 English: NAm 0000, 0100 and 0500 all on 6055; 9680 Eu, 9595 Af M-F 2000, Sat 2205, Sun 2200 (gh)

***SUDAN*** [non] 9517.44 unID in Arabic *0400-0500+ with mideast music interspersed with several low-key commentaries by M and W, possible mentions of Iran. Complete ID, frequencies and sked 0459, chewed up by RFE 9520 (Al Quaglieri, NY) It is V. of Sudan, clandestine on 9517 at 1745-1800*, and also on 8000 and new 9000 *1600-1800*; may be same usage at 0400 (Mahendra Vaghjee, Mauritius) Believed to come from Eritrea (Hans Johnson, *Cumbre DX*)

***SWITZERLAND*** [non] Merlin B-99 sked shows Red Cross to SE Europe Mon-Fri via various sites with kW power, azimuths: 11680 kHz 1115-1130 UT Cyprus 300 kW 295 az; 15115 1115-1130 Woofferton 300 114; 17870 1115-1130 Rampisham 500 115; 11680 1430-1445 Biblis 100 126; 13755 1430-1445 Cyprus 250 295; 15115 1430-1445 Rampisham 500 115 (via Andreas Volk via Wolfgang Büschel)

No languages specified. We checked for the 1430 into mid-November, but nothing heard following BBC Albanian on most of the same frequencies; perhaps a phantom registration, or plan if needed, when they get around to it.

***TIMOR EAST*** [non] Radio can help returning refugees find missing relatives. The BBC and the International Committee of the Red Cross are launching a new radio programme to help survivors of the violence in East Timor re-establish contact with each other. Radiolink service – a 15-minute programme in Indonesian to be broadcast daily from the BBC World Service in London for the next three months [until mid-Jan]. Radiolink works by people registering with their local branch of the Red Cross. Their names are passed on to the BBCWS which will broadcast daily at 1040-1055 on 7160 and 9680 (Clare Arthurs, BBC news online via Jonathan Prince, *swprograms*)

***U S A*** WBCQ notes: Al Weiner was hospitalized in October with unknown ailment, later treated with antibiotics. Shortly afterwards, he and Elayne Star were married in a Maine mall on Hallowe'en dressed as Snow White and Prince Charming. WBCQ-2 was starting test broadcasts by mid-November on 7415, and may use 9 and 12 MHz bands (*Al Weiner Worldwide*)

*The Right Perspective* UT Sat 0300 on WBCQ 7415: I have trouble believing this program is for real. Seems to be a parody of a rightwing program. Frank from Queens joins a long list of people (Mark from Michigan, John the Court Agent...) who host these programs anonymously. To me the program is too knee-jerk in terms of its conservatism, the opinions are too stereotypical of what a left-winger would consider to be an extreme right-wing program. There's more Norman Lear here than Pat Buchanan (Fred Waterer, *Listening In*, DX Ontario via Ivan Grishin) So I wonder if their big public falling out in rec.radio.sw was also a put-on? Did they all make up or did the instigator who supposedly owned the program title, go away? (gh)

At the last minute, WRMI discovered that its new 7465 would collide with Norway during the winter, so shifted to 7460 in the 0200-1030 period. We had advised Jeff White to absolutely avoid any Spanish on the new frequency, not to give the Cubans any excuse to jam it, but R. Prague Spanish relay at 0300 turned out to be jammed. What a threat Prague must be to the Revolution! (gh) WRMI planned another move to 7570 later in November (Jorge García Rangel, Venezuela)

All is not well at the so-called University Network. People who can actually stand to listen to Dr Gene Scott for more than a couple of seconds report that he has been talking about having fired some of his top people for incompetence, disloyalty or worse – Just as he embarked on expanding his egotrip to Costa Rica (gh)

Studio link WKRC Cincinnati OH, USA, was heard with slogan "55-KRC" and lots of ads around 1540 on 26110. I've put a simple web-page online with a list of these 26 MHz studio feeders and cue stations. Take a look at **http://gallery.uunet.be/gs/** (Guido Schotmans, Belgium, *hard-core-dx*)

*WORLD OF RADIO* on WWCR: Thu 2130 9475, Sat 1230 15685, Sat 2030 12160, Sun 0330 and 0730 5070, Mon 0130 3215, Mon 0600 3210, Tue 1330 15685.

***VIETNAM*** The Vietnamese Provincial Stations – You'll find a map with station locations, current schedules, and listening tips at: **http://www.cumbredx.org/cdxsp/cdxsp_viet.html** (Hans Johnson, *Cumbre DX*)

Voice of Vietnam, B99 all English, and Viet to NAm:

| | | | |
|---|---|---|---|
| 5940A | 0100-0130 | English | ENAm |
| 5940A | 0130-0230 | Vietnamese | ENAm |
| 5940A | 0230-0300 | English | ENAm |
| 7260A 9830A | 0300-0330 | Spanish | CAm |
| 7260A | 0330-0400 | English | SAm |
| 13665P | 0400-0500 | Vietnamese | WNAm |
| 9840 12020 | 1000-1030 | English | SEAs |
| 7285 | 1100-1130 | English | SEAs |
| 9840 12020 | 1230-1300 | English | SEAs |
| 9730 7145 | 1330-1400 | English | Eu |
| 7145 9730 | 1630-1700 | English | Eu |
| 7440M 7145 | 1800-1830 | English | Eu |
| 7145 9730 | 1900-1930 | English | Eu |
| 9730 | 2000-2030 | English | Eu |
| 7145 | 2030-2100 | English | Eu |
| 7145 12020 | 2330-0000 | English | SEAs |

Relays: A=Armavir, M=Moscow, P=Petopavlovsk-Amur (*Electronic DX Press*) We found the 1230 on 9840 listenable, the Far East flutter complementing the choppiness of the Vietnamese accent, heavier on the woman than the man announcer (gh, OK)

[non] Que Huong Radio, 9930, Nov 8 1530-1630; New radio station in Vietnamese, Monday to Saturday 1530-1630. News, music, forum promoting freedom and human rights. Address: Que Huong Radio, 2670 S. White Road, Suite 165, San José, CA 95148. E-mail: *qhradio@aol.com* Web: **http://www.quehuongmedia.com** Reception reports welcome (Ludo Maes, Belgium, TDP) Via KWHR.

My Vietnamese friends tell me that Que Houng means "The Country." The backer has been on Vietnamese AM radio in the San Francisco Bay Area asking for donations. The "Nigeria effect" – one exile group starts shortwave broadcasts, largely for prestige purposes, and then others copycat in order to jump on the bandwagon. This is the second Vietnamese program in the last few months. The Que Houng website has a nice South Vietnamese flag fluttering (Hans Johnson, *Cumbre DX*)

***WALES*** [non] The Wales Radio International projected B-99 schedule in last issue turned out to be completely wrong, as times really shifted and 2/3 of frequencies changed to: Fri 2130 6010 Eu, Sat 0300 9735 NAm, Sat 1130 AuAs 17650 (gh, *WOR*)

***ZANZIBAR*** Radio Tanzania-Zanzibar, 11734: Personal letter from Ali Bakari Muombwa. He also signed and returned my prepared card stating "That is true (correct)." Report was for 1989 reception, 13th report / followup, $2 return postage, NASWA country verified #194. I had asked for some information regarding Zanzibar. He stated that he would send me the information, but it would be nice if I would send him a camera first. He would wait for my reply before providing the information (Jim Evans, TN, *Cumbre DX*)

*Until the Next, Best of DX and 73 de Glenn!*

# Broadcast Logs

GLOBAL FORUM

**Gayle Van Horn**

**0003 UTC on 11875**
CUBA: Radio Havana. Interval signal to Spanish service sign-on. (Howard J. Moser, Lincolnshire, IL) English service 0150 UTC, 9820 // 6000, 11705, 13605 for ham radio program. (Sue Wilden, Noblesville, IN)

**0015 UTC on 5005**
NEPAL: Radio Nepal. Nepali. News on the Dashain festival, national politics, and item covering recent unrest in Hetauda, Ghorka and Khosaikund municipalities. Weather for Kathmandu and the rest of the kingdom followed by traditional Newar musik, fair to weak, SINPO 33322. (Thomas Roth, Germany/*Hard Core DX*) 5005, 1452-1515. (Mark Veldhuis, Borne, Netherlands/*HCDX*)

**0037 UTC on 3245**
BRAZIL: Radio Clube. Portuguese. International music show to station identifications, SINPO 23422. Brazilians audible: **Super Radio** 3325, 0047; **Radio Cultura Ondas Tropicais** 4845.2, 0820-0835; **Radio Cancao Nova** 4825, 0830-0840; **Radio Relogio Federal** 4905, 0850-0902; **Radio Cultura** 17815, 0852-0902; **Radio Brazil Tropical** 5015, 0910-0917. (Arnaldo Slaen, Buenos Aires, Argentina/*The Four Winds*)

**0040 UTC on 11905**
THAILAND: Radio Thailand. Poor signal quality for regional Asian music to items on station, // 9690, monitored to 0050 with "Tiny Tenna" antenna. (Ben Berry, New York City, NY)

**0051 UTC on 9675**
ITALY: RAI. Item on Italian delegates visit Israel, Jordan and Albania on peace missions, // 11800, 15240. (Bob Fraser, Cohasset, MA) Italian service 11800, 2352. (Moser, IL)

**0053 UTC on 6165**
NETHERLANDS ANTILLES: Radio Netherlands relay. *Newsline* with Andy Clark, program lineup and promo for *Media Network*. (Wilden, IN)

**0155 UTC on 6025**
DOMINICAN REP.: Radio Amanecer Int'l. Spanish. Good signal quality for religious programming to clear station identification. Dominican Republic's **Radio Vila** 4960, 0222-0240. (Daniele Canonica, Muggio, Switzerland)

**0156 UTC on 4939.4**
VENEZUELA: Radio Amazonas. Spanish. Best to monitor in LSB for Spanish political text to 0158. Movie theme music to 0256 and text regarding "Amazonas y puebla de Amazonas." Noted on rechecks 0226-0235. (Harold Frodge, Midland, MI)

**0322 UTC on 11615**
CZECH REP.: Radio Prague. Folk music to segment on language diversity in Prague, to *Spotlight* program. (Moser, IL) 11660 at 2315. (Fraser, MA)

**0327 UTC on 17565**
RUSSIA: Voice of. Solo folk music to dramatic readings, // 17690, fair signal. (Moser, IL) *The 20th Century* focus on the 1930s, Spanish Civil War and Edward VIII abdicates, poor signal. (Fraser, MA)

**0340 UTC on 6034.9**
COLOMBIA: La Voz de Guaviare. Spanish. Chat to station identification/freq quote at 0344. "Buenos noches" greetings to Colombian tune, open carrier to 0350*. Noted closing tune was not their anthem. SINPO 34433. (Erich Bergman, Ansbach, Germany/*HCDX*; Canonica, SUI)

**0820 UTC on 15294.96**
MALAYSIA: Voice of Malaysia. English ID amid oldies music tunes from "DJ" format to 0828. Malaysian programming commencing 0830. (Mark Veldhuis, Borne, Netherlands/*HCDX*)

**0828 UTC on 5995.26**
PERU: Radio Melodia. Spanish. Talk, interviews, time checks and brief "Melodia" ID, weak & fair quality. **Radio Luz y Sonido** 3234.88, 0947-1000. Mentions of "Huanuco," Andean vocals, ads to ID 1000; **La Voz de la Selva** 4824, 1009. (Mark Mohrmann, VT/*Cumbre DX*) **Radio Cora** 4915, 0830. (Art Robertson, Newfoundland, CAN/*CDX*)

**0848 UTC on 4875**
BRAZIL: Radiodiffusion de Roraima. Portuguese. SINPO 24432 for station ID ("Radiodiffussion de Roraima Brasil" with 590 // 4875 freq quote. Yimber Gaviria, Cali-Valle, Colombia/*TFW*) Brazil's **Radio Rio Mar** 9694.5, 2225 with futbol coverage. (Canonica, SUI)

**0900 UTC on 3365**
PAPUA NEW GUINEA: (New Guinea). Radio Milne Bay. English/Pidgin. Pops, C&W vocals to local ads. Terrific PNG conditions noted for New Guinea stations on subsequent mornings, audible as; **Radio Sandaun** 3205, 1135-1158 IDs/anthems; **Radio East Sepik** 3335, 1150 to 1200 ID; **Radio Eastern Highlands** 3395, 1120-1130; **Radio Madang** 3260 to 1155*; **Radio Simbu** 3355, 1126-1134; **Radio Morobe** 3220, 1120-1140; **Radio Gulf** 3245, 1152-1156 fade-out. (Sam Wright, Biloxi, MS)

**0915 UTC on 4890**
PAPUA NEW GUINEA: (Papua) NBC. English/Pidgin. Regional public service announcements to closing IDs. Additional Papuan **Radio Southern Highlands** audible 3275, 1155-1200. PNG (Admiralty Islands) **Radio Manus** noted 3315, 1155-1208. (Wright, MS)

**1050 UTC on 4875**
INDONESIA: (Irian Jaya) RRI Sorong. Indonesian. Text to regional pop vocals. (Wright, MS) I.J.'s **RRI Fak-Fak** 4789, 1335-1348 including interval signal to ID, brief chats. (R.T.Wallace, Eugene, OR) **RRI Merauke** 3905, 2010-2035. (Schnitzer, Germany/*HCDX*)

**1159 UTC on 11940.3**
CAMBODIA: National Voice of. Open carrier to English ID twice by lady announcer. Slow Asian music tunes. Muffled audio for 1213*, melody interval signal format 1214 into French service. Brief interlude into newscast at 1216. SINPO at best 34433. (Veldhuis, NLD/*HCDX*)

**1530 UTC on 4925**
INDONESIA: (Kalimantan) RRI Pontianak. Indonesian text to lagu pops // 3976.1. Additional Indo's audible as; (Sumatra) **RRI Pekanbaru** 5040, 1540-1551; (Sumatra) **RRI Bandar Lampung** 3395.1,1605-1615. (Wallace, OR) Sumatra's **RRI Jambi** 4925, 1501-1515. Java's **Voice of Indonesia** 11785, 1747-1803. (Veldhuis, NLD/*HCDX*) Sulawesi's **RRI Manado** 3214.8-3215, 2125-2135 & **RRI Gorontalo** 3264.7, 2135-2155* (Schnitzer, Germany/*HCDX*)

**1548 UTC on 17720**
ROMANIA: Radio Romania Int'l. Coverage on conference in Bucharest, good quality. 2300 broadcast on 11810. (Wilden, IN)

**1743 UTC on 3274.8**
MOZAMBIQUE: Radio Mocambique. Portuguese. Male announcer's mention of Beira to brief instrumental jingle. Program intro for "Jornal" magazine show, SINPO 23332. (Veldhuis, NLD/*HCDX*) station also broadcast on // 3210. -*ed.*

**1827 UTC on 11570**
PAKISTAN: Radio Pakistan. Pakistani music to English IDs at 1828. Regional item to music program and political news. (Frodge, MI)

**1910 UTC on 17680**
CHILE: La Voz de Cristiana. Spanish. Religious pop tunes to clear and frequent IDs, jingles and ads // 21550. (Tom Banks, Dallas, TX) 2334-0000, 17680 (Moser, IL)

**1956 UTC on 15184.9**
EQUATORIAL GUINEA: Radio Africa. Closing bits of sermon to Salvation Army's *Wonderful Words of Life* at 1958, more of same format. (Frodge, MI)

**2025 UTC on 15285**
SPAIN: Radio Exterior Espana. Soccer scores to weather forecast update and item on *Spanish Heritage Day*. (Moser, IL)

**2240 UTC on 5025**
PERU: Radio Quillabamba. Spanish. Mensajes, huaynos music to ID, SINPO 23322. (Schnitzer, Germany/*HCDX*) Peru's **Radio Huanta** 2000, 4746.5 audible 2343-2355. (Veldhuis, NLD/*HCDX*)

**2250 UTC on 4796.5**
BOLIVIA: Radio Mallku. Spanish. Weak and noisy, had to use my JPS NF-60 notch filter to rid of tones. Talk and Bolivian flute music, for fair signal. Subsequent station check 2315-2350 noting improved quality peaking including 2300 ID. (Veldhuis, NLD/*HCDX*)

**2330 UTC on 13640**
TURKEY: Voice of. Feature on early Christian communities and the *Seven Churches* // 7190. (Fraser, MA) 0316 English on 11655. (Moser, IL)

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*Thanks to our contributors — Have you sent in YOUR logs?*
*Send to* ***Gayle Van Horn,*** *c/o Monitoring Times (or e-mail gayle@webworkz.com)*
*English broadcast unless otherwise noted.*

**Gayle Van Horn,** gayle@webworkz.com

# The Quest Continues...QSLing Medium Wave

Medium wave QSLing...AM QSLing... call it what you like, this popular aspect of the radio hobby remains one of the most active in the quest for verifications.


The whole process begins as in shortwave, with a basic reception report with the date, time (in the station's local time), frequency and program details. Such verifiable information should include commercials, on-air personality names, program titles or format, plus public service announcement topics.

If music is heard indicate the type, but don't get too tied down with every name and artist. Except for the Canadians, who require an active radio log, many stations have discontinued their playlist. List the basics, but skip word for word details. Most stations have had staff cutbacks and have little time to answer mail. The last thing you want to do is bore your reader with pages of details or a demanding demeanor.

Keep your report light, friendly and conversational , and tell a bit about yourself or your equipment. It couldn't hurt to briefly explain what AM DXing is as well as QSLing. Not every program director or general manager understands the concept of DXing, much less QSLing – which is why I always recommend you send your letter to the Chief Engineer. He should at least have a basic understanding. You might just luck out and find one who is a hobbyist.

If you still haven't received a reply within three to four months, try a friendly follow up letter; include your original report as well as return postage. Mint stamps or currency and an SASE work wonders, with a local souvenir postcard.

Above all, keep it simple, courteous and to the point! The impression you present as a hobbyist could affect all of us!

**ALGERIA**

Radiodiffusion Algerienne, 15160 kHz. Full data logo QSL card unsigned, plus report form and schedule. Received in 45 days for second English follow up report, cassette tape and one U.S. dollar. Station address: 21 Blvd. Des Martyrs, 16000 Algiers, Algeria. (Randy Stewart, Springfield, MO)

**EGYPT**

Radio Cairo, 9900 kHz. Full data card signed with illegible signature, plus brochure. Received in 68 days for an English report, one IRC, SASE (not used) and souvenir postcard. A slow verifier but they do eventually come through! Station address: P.O. Box 566, Cairo, Egypt 11511. (Tom Banks, Dallas, TX)8

**INDIA**

All India Radio-Mumbai, 4840 kHz. Full data card signed by A.K. Bhatnagar-Director Frequency Assignments. Card received direct from Delhi. Received in one year from follow up report. Station address: P.O. Box 70, New Delhi-110 011 India.(Daniele Canonica, Muggio, Switzerland) Domestic service address: P.O. Box 13034, Mumbai-400 020, Maharashtra, India. - *ed*.

**INDONESIA**

Irian Jaya-RRI Fak Fak, 4790 kHz. Full data verie letter signed by Drs. Tukiran Erlantoko. Received in 86 days for a taped report and mint stamps. Station address: Jalan Kapten P. Tenddean, Kotak Pos 54, Fak-Fak 98601, Irian Jaya, Indonesia. (Mickey Delmage, Edmonton, Alberta, Canada)

Irian Jaya-RRI Sorong, 4875 kHz. Full data verification letter signed by Mughpar Yushaputra. Received in 84 days for an English report, mint stamps and a SASE (used for reply). Station address: Kotak Pos 146, Sorong 98414, Irian Jaya, Indonesia.

**MEDIUM WAVE**

KENO, 1460 kHz AM. Partial data verification letter signed by Bill Croghan-Chief Engineer. Received in 45 days for an AM report and one US dollar. Station address: 4660 S. Decatur Blvd., Las Vegas, NV 89103. (Patrick Griffith, Federal Heights, CO)

KFNN, 1510 kHz AM. Prepared QSL card signed by Eric Smith. Received in 96 days for a taped report. Station address: 4800 N. Central Ave., Phoenix, AZ 85012. (Patrick Martin, Seaside, OR)

KIHM, 1590 kHz AM. Verification letter signed by Jerry J. Usher-Director of Programming. Also enclosed was a verification letter for their station KSMH 1620 kHz AM, signed by Jerry J. Usher. Received in 21 days for an AM report. Station address: Immaculate Heart Radio, P.O. Box 70685, Reno, NV 89570. (Martin, OR)

KNZZ, 1100 kHz AM. Partial data verification letter signed by Lisa McCoy-Office Manager, plus two bumper stickers. Received in 47 days for an AM report and one U.S. dollar. Station address: 1360 E. Sherwood Dr., Grand Junction, CO 81501. (Griffith, CO)

KRDY, 620 kHz AM. Partial data verification letter signed by Ken Piling-Operations Manager. Received in 51 days for an AM report and one U.S. dollar. Station address: 660 Rood Ave., Grand Junction, CO 81501. (Griffith, CO)

WRNC, 1670 kHz AM. Second form letter signed by Richard W. Hamilton-Transmitter Engineer. Station address: 7080 Industrial Hwy, Macon, GA 31216. (Martin, OR)

WSAI, 1530 kHz AM. Full data QSL card signed by D. Mason-Chief Engineer. Received in 43 days after follow up report. Station address: 1111 St. Gregory St., Cincinnati, OH 45202. (Martin, OR)

**MOROCCO**

Radio Mediterraneee International 9575 kHz. Full data logo card and letter with illegible signature, plus schedule and sticker. Received in 220 days for a taped report and one IRC. Station address: Boite Postal 2055, Tanger, Morocco (or) 3, rue Emsallah, 90000 Tanger, Morocco. (Delmage, CAN)

**NIGERIA**

Radio Nigeria-Ibadan, 6050 kHz. Partial data letter signed by Dare Folarin. Received in three months from follow up report sent registered with a SASE (used for reply) and one U.S. dollar. Station address: Broadcasting House, Private Mail Bag 5003, Ibadan, Oyo State, Nigeria. (Greg Myers, VA/*Cumbre DX*)

**PAPUA NEW GUINEA**

New Guinea-Radio Simbu, 3355 kHz. Partial data verification letter signed by Paia Ottawa. Received in seven weeks for an English report and two U.S. dollars. Station address: P.O. Box 228, Kundiawa, Chimbu, Papua New Guinea. (Myers, Va/*CDX*)

**ST HELENA**

Radio St. Helena, 11092.5 kHz, Full data map/ZD7RSD card signed by Ralph H. Peters, plus form letter and personal letter from Tony Leo regarding my winning the book *The History of Plantation House*. Received in 347 days for an English report. Station address: Broadway House, Main Street, Jamestown, St. Helena, South Atlantic Ocean. (Delmage, CAN) Received full data card in one year, on the exact day of the October 99 broadcast! (Fred S. Kohlbrenner, PA, *CDX*)

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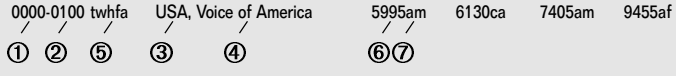


**Convert your time to UTC.**

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5,6, 7, or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each page.

Note that all *dates*, as well as times, are in UTC; for example, a show which might air at 0030 UTC *Sunday* will be heard on *Saturday* evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

**Find the station you want to hear.**

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not *daily*, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

**Day Codes**

| | |
|---|---|
| s | Sunday |
| m | Monday |
| t | Tuesday |
| w | Wednesday |
| h | Thursday |
| f | Friday |
| a | Saturday |

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

**Choose the most promising frequencies for the time, location and conditions.**

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions. But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before publication.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

**Target Areas**

| | |
|---|---|
| af: | Africa |
| al: | alternate frequency (occasional use only) |
| am: | The Americas |
| as: | Asia |
| au: | Australia |
| ca: | Central America |
| do: | domestic broadcast |
| eu: | Europe |
| me: | Middle East |
| na: | North America |
| om: | omnidirectional |
| pa: | Pacific |
| sa: | South America |
| va: | various |

**Consult the propagation charts.**

To further help you find a strong signal, we've included a chart on page 64 which takes into account conditions affecting the audibility of shortwave broadcasts. Simply pick out the section of the chart for the region in which you live and find the line for the region in which the station you want to hear is located. The chart indicates the optimum frequencies (in megahertz-MHz) for a given time in UTC. (Users outside North America can use the same procedure in reverse to find best reception from North America.)

**Choose a program or station you want to hear.**

Some selected programs appear on the lower half of the page for prime listening hours – space does not permit 24-hour listings. Our program manager changes the stations and programming featured each month to reflect the variety available on shortwave, though BBC programs are almost always included.

Occasionally program listings will be followed by "See X 0000." This information indicates that the program is a rerun, and refers to a previous summary of the program's content. The capital letter stands for a day of the week, using the same day codes as in the frequency listing (see above), and the four digits represent a time in UTC.


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## Program Highlights

### Jim Frimmel, Programming manager

Selected programs this month feature the programs of **World Harvest Radio** and **Radio Canada International**.

World Harvest Radio transmits from three locations: Noblesville, Indiana; Greenbush, Maine; and Naalehu, Hawaii. The Indiana station is known as WHRI and was the first to go on the air. It broadcasts using two transmitters known as Angel 1 and Angel 2. The Hawaii station uses the callsign KWHR and also uses two transmitters which are called Angel 3 and Angel 4. WHRA, the Maine station uses a single transmitter known as Angel 5.

*Program listings for World Harvest Radio are shown as WHR* followed by the Angel identifier. This allowed the combining of program material in cases where programs are simultaneously broadcast over multiple transmitters.

Shortwave listening is better than it has been in years. Be sure to take advantage of these solar conditions as we approach our solar peak in this sunspot cycle. Bandscanning can be very rewarding during this period. Try sweeping through the following frequency ranges to ferret out those elusive broadcasts. Remember that lower bands are better at night.

49 meterband: 5800-6205 kHz
41 meterband: 7100-7570 kHz
31 meterband: 9345-9990 kHz
25 meterband: 11545-12160 kHz
22 meterband: 13565-13875 kHz
19 meterband: 15005-15805 kHz
16 meterband: 17475-17905 kHz
15 meterband: 18895-19025 kHz
13 meterband: 21450-21855 kHz
11 meterband: 25595-26105 kHz

Some of these lower and upper frequencies are actually out-of-band. But, since they are used by some broadcasters, it's a good idea to start lower and end higher.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0000-0100 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0000-0100 vl | Australia, ABC/Katherine | 5025do | | | |
| 0000-0100 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0000-0100 | Australia, Radio | 9660as | 12080as | 15240as | 17580as |
| | | 17750as | 17795as | 21740as | |
| 0000-0100 | Bulgaria, Radio | 7375na | 9400na | | |
| 0000-0015 | Cambodia, Natl Radio Of | 11940as | | | |
| 0000-0100 | Canada, CBC N Quebec Svc | 9625do | | | |
| 0000-0100 | Canada, CFRX Toronto | 6070do | | | |
| 0000-0100 | Canada, CFVP Calgary | 6030do | | | |
| 0000-0100 | Canada, CHNX Halifax | 6130do | | | |
| 0000-0100 | Canada, CKZN St John's | 6160do | | | |
| 0000-0100 | Canada, CKZU Vancouver | 6160do | | | |
| 0000-0029 | Canada, Radio Canada Intl | 5960na | 9755na | | |
| 0000-0029 twhfa | Canada, Radio Canada Intl | 6040na | 9535am | 11865am | |
| 0000-0100 | Costa Rica,RF Peace Intl | 6975va | 15050va | 21460va | |
| 0000-0100 | Ecuador, HCJB | 9745na | 12015na | 21455na | |
| 0000-0030 | Egypt, Radio Cairo | 9900am | | | |
| 0000-0100 vl | Guatemala, Radio Cultural | 3300do | | | |
| 0000-0100 | Guyana, GBC/Voice of | 5950do | | | |
| 0000-0045 | India, All India Radio | 7410as | 9705as | 9950as | 11620as |
| | | 13625as | | | |
| 0000-0100 | Japan, Radio/NHK | 6050eu | 6155eu | 9665af | 11705na |
| 0000-0015 | Japan, Radio/NHK | 11815as | 13650as | | |
| 0000-0100 | Kiribati, Radio | 9810do | | | |
| 0000-0100 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 0000-0100 | Malaysia, Radio | 7295do | | | |
| 0000-0100 | Malaysia, RTM Sarawak | 7160do | | | |
| 0000-0100 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 0000-0030 | Mexico, Radio Mexico Intl | 9705am | | | |
| 0000-0100 | Namibia, NBC | 3270af | 3289af | | |
| 0000-0100 | Netherlands, Radio | 6165na | 9845na | | |
| 0000-0100 | New Zealand, R NZ Intl | 17675va | | | |
| 0000-0100 | North Korea, R Pyongyang | 11845am | 13650am | 15230am | |
| 0000-0100 vl | Papua New Guinea, NBC | 9675do | | | |
| 0000-0100 | Philippines, FEBC R Intl | 15175do | | | |
| 0000-0100 | Singapore,RCorp Singapore | 6150do | | | |
| 0000-0100 | Spain, R Exterior Espana | 6055na | | | |
| 0000-0030 | Thailand, Radio | 9655af | 9680va | 11905af | |
| 0000-0100 | UK, BBC World Service | 3915as | 5965as | 5975na | 6175na |
| | | 6195as | 7110as | 9410as | 9590am |
| | | 9915eu | 11945as | 11955as | 12095sa |
| | | 15280as | 15310as | 15360as | 17615as |
| | | 17790as | | | |
| 0000-0100 vl | UK, IBC Tamil | 9355va | | | |
| 0000-0100 f | UK, Merlin Network One | 3985eu | 6180eu | 7165eu | |
| 0000-0100 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0000-0100 | USA, KAIJ Dallas TX | 5810na | | | |
| 0000-0100 | USA, KJES Vado NM | 7555na | | | |
| 0000-0100 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0000-0100 | USA, KWHR Naalehu HI | 17510as | | | |
| 0000-0030 | USA, Voice of America | 7215as | 9890as | 11760as | 15185as |
| | | 15290as | 17735as | 17820as | |
| 0000-0100 twhfa | USA, Voice of America | 5995am | 6130ca | 7405am | 9455af |
| | | 9775am | 11695ca | 13740am | |
| 0000-0100 | USA, WBCQ Monticello ME | 7415na | | | |
| 0000-0100 | USA, WEWN Birmingham AL | 5825na | 9355eu | | |
| 0000-0100 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 0000-0100 | USA, WHRA Greenbush ME | 7580na | | | |
| 0000-0100 | USA, WHRI Noblesville IN | 5745na | 7315na | | |
| 0000-0100 | USA, WINB Red Lion PA | 11950am | | | |
| 0000-0100 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0000-0100 | USA, WRNO New Orleans LA | 7355na | | | |
| 0000-0100 | USA, WSHB Cypress Crk SC | 7535na | 9430am | 15285ca | |
| 0000-0100 | USA, WTJC Newport NC | 9370na | | | |
| 0000-0100 | USA, WWCR Nashville TN | 3215na | 5070na | 5935na | 7435na |
| 0000-0100 | USA, WYFR Okeechobee FL | 6085na | 9505na | | |
| 0000-0030 vl | Vanuatu, Radio | 4960do | | | |
| 0010-0020 | Kyrgyzstan, Kyrgyz Radio | 4010eu | 4050eu | | |
| 0015-0045 as | Armenia, Trans World R | 6240eu | | | |
| 0015-0045 as | Monaco, Trans World Radio | 6240as | | | |
| 0030-0100 | Iran, VOIRI | 9022am | 9795ca | 11970na | |
| 0030-0100 | Lithuania, Radio Vilnius | 6120na | | | |
| 0030-0100 vl | Solomon Islands, SIBC | 5020do | | | |
| 0030-0100 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 0030-0100 | Thailand, Radio | 9655as | 11905as | 13695na | |
| 0050-0100 | Germany, Int'l BC Tamil | 7150na | 7460na | | |
| 0050-0100 | Italy, RAI Intl | 6010na | 9675na | 11800na | |

## Selected Programs

### Sundays

0000 Canada, RCI Montreal: CBC Radio News. News, sports, and weather from the Canadian Broadcasting Corporation.
0000 Thailand, Radio: News.
0000 WHR (Angel 2): Acts 1:8 Ministry. Rick Walters.
0000 WHR (Angel 3): DXing with Cumbre. A what's-on-the-air program hosted by Marie Lamb.
0000 WHR (Angel 5): USA Radio News. A five-minute news bulletin.
0002 WHR (Angel 5): The Countdown Magazine (hour 1). The top twenty contemporary Christian music hits in the country.
0005 Canada, RCI Montreal: Global Village. Vignettes about music in the little corners of the world.
0005 Thailand, Radio: News in Perspective.
0030 Thailand, Radio: Music.
0030 WHR (Angel 2): Christ at the Door. Hal Miller.
0030 WHR (Angel 3): Full Gospel Hour. Terry Blalock.
0035 Thailand, Radio: World News.
0045 Thailand, Radio: Business News.
0045 WHR (Angel 2): Dangers of Apathy. No information available.
0052 Thailand, Radio: Social News.
0056 Thailand, Radio: Sports News.

### Mondays

0000 Canada, RCI Montreal: CBC Radio News. See S 0000.
0000 Thailand, Radio: News.
0000 WHR (Angel 1/2/5): USA Radio News. See S 0000.
0002 WHR (Angel 5): The Countdown Magazine (hour 1). See S 0002.
0005 Thailand, Radio: News in Perspective.
0005 WHR (Angel 1): Music. See S 0205.
0005 WHR (Angel 2): Radio Liberty (live). The story behind the story and the news behind the news.
0007 Canada, RCI Montreal: Roots and Wings. Philly Markowitz plays the rare, the beautiful and the unexpected music from the four corners of our world.
0030 Thailand, Radio: Thai Culture.
0030 WHR (Angel 2): The Prophecy Club. Stan Johnson discusses bible prophecy from Topeka, Kansas.
0035 Thailand, Radio: World News.
0044 Thailand, Radio: Business News.
0049 Thailand, Radio: Social News.
0053 Thailand, Radio: Sports News.
0058 Thailand, Radio: Weather Forecast.

### Tuesday-Saturday

0000 Canada, RCI Montreal: The World at Six. See M 2300.
0000 Thailand, Radio: News.
0000 WHR (Angel 1/2/3/5): USA Radio News. See S 0000.
0005 Thailand, Radio: News in Perspective.
0005 WHR (Angel 1/3): Music. See S 0205.
0005 WHR (Angel 2): Radio Liberty (live). See M 0005.
0005 WHR (Angel 5): The Stan Johnson Show. Stan Johnson with talk radio from the heart of America.
0030 Thailand, Radio: Music.
0035 Thailand, Radio: World News.
0045 Thailand, Radio: Business News.
0052 Thailand, Radio: Social News.
0056 Thailand, Radio: Sports News.

### Hauser's Highlights

### BULGARIA: R. Bulgaria

B-99 in English daily for one hour from Plovdiv site with kW powers and azimuths:

| UT | kHz kW/deg | kHz kW/deg | Target |
|---|---|---|---|
| 0000 | 7375 500/295 | 9400 500/306 | NAm |
| 0300 | 7375 500/295 | 9400 500/306 | NAm |
| 1200 | 15700 500/306 | 17500 250/292 | WEu |
| 2000 | 5845 250/306 | 7535 500/306 | WEu |
| 2200 | 7535 500/306 | 7545 500/295 | WEu |

(*Observer*, Bulgaria)

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0100-0200 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0100-0200 vl | Australia, ABC/Katherine | 5025do | | | |
| 0100-0200 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0100-0200 | Australia, Radio | 9660as | 12080as | 15240as | 15415as |
| | | 17580as | 17750as | 17795as | 21725as |
| 0100-0200 | Canada, CBC N Quebec Svc | 9625do | | | |
| 0100-0200 | Canada, CFRX Toronto | 6070do | | | |
| 0100-0200 | Canada, CFVP Calgary | 6030do | | | |
| 0100-0200 | Canada, CHNX Halifax | 6130do | | | |
| 0100-0200 | Canada, CKZN St John's | 6160do | | | |
| 0100-0200 | Canada, CKZU Vancouver | 6160do | | | |
| 0100-0200 | Costa Rica,RF Peace Intl | 6975va | 15050va | 21460va | |
| 0100-0200 | Cuba, Radio Havana | 6000na | 9820na | 11705na | 13605na |
| 0100-0127 | Czech Rep, R Prague Intl | 7345na | 9665na | | |
| 0100-0200 | Ecuador, HCJB | 9745na | 12015na | 21455va | |
| 0100-0145 | Germany, Deutsche Welle | 6040na | 6145am | 9640am | 9700na |
| | | 9760na | | | |
| 0100-0130 s | Germany, Universal Life | 9495as | | | |
| 0100-0130 m | Germany, V O Deliverance | 6120na | | | |
| 0100-0200 s | Germany,Good News World R | 9855eu | | | |
| 0100-0200 | Germany,Overcomer Ministr | 9470as | | | |
| 0100-0200 vl | Guatemala, Radio Cultural | 3300do | | | |
| 0100-0200 | Guyana, GBC/Voice of | 5950do | | | |
| 0100-0200 | Indonesia, Voice of | 9525va | | | |
| 0100-0130 | Iran, VOIRI | 9022am | 9795ca | 11970na | |
| 0100-0110 | Italy, RAI Intl | 6010na | 9675na | 11800na | |
| 0100-0200 | Japan, Radio/NHK | 9660me | 11860as | 11870me | 15325as |
| | | 15590as | 17685au | 17835sa | 21670pa |
| 0100-0200 | Kenya, Kenya BC Corp | 4885do | | | |
| 0100-0130 | Kiribati, Radio | 9810do | | | |
| 0100-0200 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 0100-0200 | Malaysia, Radio | 7295do | | | |
| 0100-0200 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 0100-0200 | Namibia, NBC | 3270af | 3289af | | |
| 0100-0125 | Netherlands, Radio | 6165na | 9845na | | |
| 0100-0200 | New Zealand, R NZ Intl | 17675va | | | |
| 0100-0200 vl | Papua New Guinea, NBC | 9675do | | | |
| 0100-0200 | Philippines, FEBC R Intl | 15175as | | | |
| 0100-0130 | Serbia, Radio Yugoslavia | 7115na | | | |
| 0100-0200 | Singapore,RCorp Singapore | 6150do | | | |
| 0100-0130 | Slovakia, R Slovakia Intl | 5930na | 7300ca | 9440sa | |
| 0100-0200 vl | Solomon Islands, SIBC | 5020do | | | |
| 0100-0200 | Spain, R Exterior Espana | 6055na | | | |
| 0100-0200 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 0100-0130 | Switzerland, Swiss R Intl | 9885am | 9905am | | |
| 0100-0200 | UK, BBC World Service | 5965as | 5975na | 6175na | 6195as |
| | | 9410as | 9590am | 9915am | 11955as |
| | | 12095sa | 15280as | 15310as | 15360as |
| | | 17790as | | | |
| 0100-0200 f | UK, Merlin Network One | 3985eu | 6180eu | 7165eu | |
| 0100-0200 | Ukraine, R Ukraine Intl | 6020eu | 9560eu | 9810va | |
| 0100-0200 | USA, Armed Forces Network | 4278am | 6478am | 12689am | |
| 0100-0200 | USA, KAIJ Dallas TX | 5810na | | | |
| 0100-0200 | USA, KJES Vado NM | 7555na | | | |
| 0100-0200 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0100-0200 | USA, KWHR Naalehu HI | 17510as | | | |
| 0100-0200 | USA, Voice of America | 7115as | 7200as | 11705as | 15250as |
| | | 15300as | 17740as | 17820as | |
| 0100-0200 twhfa | USA, Voice of America | 5995am | 6130am | 7405am | 9455af |
| | | 9775am | 13740am | | |
| 0100-0200 | USA, WBCQ Monticello ME | 7415na | | | |
| 0100-0200 | USA, WEWN Birmingham AL | 5825na | 9355eu | | |
| 0100-0200 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 0100-0200 | USA, WHRA Greenbush ME | 7580na | | | |
| 0100-0200 | USA, WHRI Noblesville IN | 5745na | 7315na | | |
| 0100-0200 | USA, WINB Red Lion PA | 11950am | | | |
| 0100-0200 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0100-0145 m | USA, WRMI/R Miami Intl | 9955am | | | |
| 0100-0200 | USA, WRNO New Orleans LA | 7355na | | | |
| 0100-0200 | USA, WSHB Cypress Crk SC | 7535na | 9430am | 15285ca | |
| 0100-0200 | USA, WTJC Newport NC | 9370na | | | |
| 0100-0200 | USA, WWCR Nashville TN | 3215na | 5070na | 5935na | 7435na |
| 0100-0200 | USA, WYFR Okeechobee FL | 6065na | 9505na | 11750as | 15165as |
| 0100-0130 | Uzbekistan, R Tashkent | 5955as | 5975as | 7105as | 7285as |
| | | 9540as | | | |
| 0100-0127 | Vietnam, Voice of | 5940na | | | |
| 0115-0145 vl | Libya, Voice of Africa | 15235va | 15415va | 15435va | |
| 0130-0200 | Sweden, Radio | 9495as | | | |
| 0130-0200 | UK, RTE Radio | 6155eu | | | |
| 0140-0150 | Greece, Voice of | 7450na | 9375na | 9420na | 12105na |
| 0140-0200 | Vatican City, Vatican R | 7335au | 9650au | | |
| 0145-0200 twhfa | USA, WRMI/R Miami Intl | 9955am | | | |

## Selected Programs

### Sundays

0100 WHR (Angel 2): Open Bible Dialog. Joseph Chambers takes listeners' phone calls.
0100 WHR (Angel 5): USA Radio News. See S 0000.
0102 WHR (Angel 5): The Countdown Magazine (hour 2). See S 0002.
0140 Vatican State, Vatican Radio: Liturgical Reflection. Discussion of a topic from church liturgy.
0152 Vatican State, Vatican Radio: News. A bulletin of international news.

### Mondays

0100 WHR (Angel 2): Black Robed Brigade. John Lewis.
0100 WHR (Angel 3): The Call to Worship. See S 1430.
0100 WHR (Angel 5): USA Radio News. See S 0000.
0105 WHR (Angel 5): Music. See S 0205.
0130 WHR (Angel 3): Faith Mountain Ministries. See S 1330.
0140 Vatican State, Vatican Radio: Focus on the Church. News about the church in the region and around the world.
0145 WHR (Angel 1): Truth for the World. See S 0645.
0150 Vatican State, Vatican Radio: The Backgrounder. Weekly interview program.
0152 Vatican State, Vatican Radio: News. See S 0152.

### Tuesday-Saturday

0100 WHR (Angel 2): Southwest Radio Church. Noah Hutchings.
0100 WHR (Angel 3): Music. See S 0205.
0100 WHR (Angel 5): The Stan Solomon Show (live). Stan Soloman.
0152 Vatican State, Vatican Radio: News. See S 0152.

### Tuesdays

0130 WHR (Angel 2): The Prophecy Club. See M 0030.
0140 Vatican State, Vatican Radio: Focus on the Church. See M 0140.

### Wednesdays

0130 WHR (Angel 2): The Prophecy Club. See M 0030.

### Thursdays

0130 WHR (Angel 2): The Prophecy Club. See M 0030.
0140 Vatican State, Vatican Radio: News of the Church. News of the Catholic Church in the Vatican and around the world.
0145 Vatican State, Vatican Radio: Mailbox. Letters from listeners are read on-the-air and frequency changes are announced when planned.

### Fridays

0130 WHR (Angel 2): The Prophecy Club. See M 0030.

### Saturdays

0105 WHR (Angel 3): Home Schooling (live). Terry and Vicki Brady of the Home Education network take calls about schooling.
0130 WHR (Angel 2): The Prophecy Club. See M 0030.
0140 Vatican State, Vatican Radio: News from the African Church. Activities of the Catholic Church in Africa.

### Hauser's Highlights

### SINGAPORE: Radio Corporation of Singapore

Composite HF sked for external and domestic networks for B99. New (*) channels:

| kHz | Svc | UT | | kHz | Svc | UT | |
|---|---|---|---|---|---|---|---|
| 6000 | RSI | 1100-1400 | Mandarin | 7235* | RSI | 0900-1200 | Malay |
| | DS | 1400-1600 | 2200-0000 | | DS | 2300-0900 | 1200-1600 |
| 6150 | RSI | 1100-1400 | English | 9590* | RSI | 1100-1400 | English |
| | DS | 1400-1600 | 2300-1100 | 9665* | RSI | 0900-1200 | Malay |
| 7170 | DS | 2300-1600 | Tamil | | | 1200-1400 | Indonesian |
| | | | | 9820* | RSI | 1100-1400 | Mandarin |

(*Electronic DX Press*)
9590 clashes with KTWR and Iran; 9820 with Bonaire and China (Alan Davies, Malaysia, *BC-DX*) RN quickly moved to 9790 (gh)

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0200-0300 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0200-0300 twhfa | Argentina, RAE | 11710am | | | |
| 0200-0300 vl | Australia, ABC/Katherine | 5025do | | | |
| 0200-0300 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0200-0300 | Australia, Radio | 9660as | 12080as | 15240as | 15415as |
| | | 15515as | 17580as | 17750as | 21725as |
| 0200-0210 | Bangladesh, Bangla Betar | 4880as | | | |
| 0200-0300 | Canada, CBC N Quebec Svc | 9625do | | | |
| 0200-0300 | Canada, CFRX Toronto | 6070do | | | |
| 0200-0300 | Canada, CFVP Calgary | 6030do | | | |
| 0200-0300 | Canada, CHNX Halifax | 6130do | | | |
| 0200-0300 | Canada, CKZN St John's | 6160do | | | |
| 0200-0300 | Canada, CKZU Vancouver | 6160do | | | |
| 0200-0300 | Canada, Radio Canada Intl | 6155am | 9535am | 9755am | 9780am |
| | | 11865am | | | |
| 0200-0300 | Costa Rica,RF Peace Intl | 6975va | 15050va | 21460va | |
| 0200-0205 | Croatia, Croatian Radio | 7280al | 9925na | | |
| 0200-0300 | Cuba, Radio Havana | 6000na | 9820na | 11705na | 13605na |
| 0200-0227 | Czech Rep, R Prague Intl | 6200na | 7345na | | |
| 0200-0300 | Ecuador, HCJB | 9745na | 12015na | 21455va | |
| 0200-0300 | Egypt, Radio Cairo | 9475am | | | |
| 0200-0245 | Germany, Deutsche Welle | 7285as | 9615as | 9765as | 11965as |
| 0200-0300 | Guyana, GBC/Voice of | 5950do | | | |
| 0200-0230 | Hungary, Radio Budapest | 9835na | | | |
| 0200-0300 | Kenya, Kenya BC Corp | 4935do | | | |
| 0200-0300 | Malaysia, Radio | 7295do | | | |
| 0200-0230 | Myanmar, Radio | 7185do | | | |
| 0200-0300 | Namibia, NBC | 3270af | 3289af | | |
| 0200-0300 | New Zealand, R NZ Intl | 17675va | | | |
| 0200-0300 vl | Papua New Guinea, NBC | 9675do | | | |
| 0200-0256 | Romania, R Romania Intl | 9510as | 9570na | 9690as | 11740as |
| | | 11830as | 11940as | | |
| 0200-0300 | Russia,Voice of Russia WS | 7180na | 12020na | 13665na | 15470]a |
| 0200-0230 | Serbia, Radio Yugoslavia | 7130na | | | |
| 0200-0300 | Singapore,RCorp Singapore | 6150do | | | |
| 0200-0300 vl | Solomon Islands, SIBC | 5020do | | | |
| 0200-0300 | South Korea, R Korea Intl | 7275as | 11725sa | 11810sa | 15575na |
| 0200-0300 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 0200-0300 | Taiwan, Radio Taipei Intl | 5950na | 9680na | 11740as | 11745va |
| | | 11825pa | 15345as | | |
| 0200-0300 | UK, BBC World Service | 5975na | 6135am | 6175na | 6185am |
| | | 9410as | 9770af | 9915eu | 11955as |
| | | 12095sa | 15280as | 15310as | 17790as |
| 0200-0206 a | UK, BBC World Service | 6195as | | | |
| 0200-0300 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0200-0300 | USA, KAIJ Dallas TX | 5810na | | | |
| 0200-0230 | USA, KJES Vado NM | 7555na | | | |
| 0200-0300 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0200-0300 | USA, KWHR Naalehu HI | 17510as | | | |
| 0200-0300 | USA, Voice of America | 7115as | 7200as | 9740as | 9850as |
| | | 11705as | 15250as | 15300as | 17740as |
| | | 17820as | | | |
| 0200-0300 | USA, WBCQ Monticello ME | 7415na | | | |
| 0200-0300 | USA, WEWN Birmingham AL | 5825na | | | |
| 0200-0300 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 0200-0300 | USA, WHRA Greenbush ME | 7580na | | | |
| 0200-0300 | USA, WHRI Noblesville IN | 5745na | 7315sa | | |
| 0200-0300 | USA, WINB Red Lion PA | 11950am | | | |
| 0200-0300 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0200-0300 | USA, WRMI/R Miami Intl | 7460am | | | |
| 0200-0300 | USA, WRNO New Orleans LA | 7355na | | | |
| 0200-0300 | USA, WSHB Cypress Crk SC | 5850na | 7535ca | 9430na | |
| 0200-0300 | USA, WTJC Newport NC | 9370na | | | |
| 0200-0300 | USA, WWCR Nashville TN | 3215na | 5070na | 5935na | 7435na |
| 0200-0300 | USA, WYFR Okeechobee FL | 6065na | 9505na | | |
| 0215-0220 | Nepal, Radio | 3230as | 5005as | | |
| 0230-0300 | Austria, R Austria Intl | 7325na | | | |
| 0230-0245 | Pakistan, Radio | 9640as | 15485as | 17660as | 17895as |
| 0230-0300 vl | Philippines, R Pilipinas | 11885as | 15120as | 15270as | |
| 0230-0300 | Sweden, Radio | 7290na | | | |
| 0230-0257 | Vietnam, Voice of | 5940na | | | |
| 0245-0300 | Albania, R Tirana Intl | 6115na | 7160na | | |
| 0250-0300 | Vatican City, Vatican R | 7305am | 9605am | | |

## Selected Programs

### Sundays

0200 Canada, RCI Montreal: RCI News. News, weather, and sports from Radio Canada International.
0200 WHR (Angel 1): USA Radio News. See S 0000.
0200 WHR (Angel 3): The Bread of Life Broadcast. Ron Kresge preaches from the Church of God at Norwalk, Connecticut.
0200 WHR (Angel 5): DXing with Cumbre. See S 0000.
0205 WHR (Angel 1): Music. Contemporary christian music and inspiration.
0207 Canada, RCI Montreal: Venture Canada. David Blair presents this weekly magazine that promotes Canadian business ventures.
0215 WHR (Angel 3): Music. See S 0205.
0230 WHR (Angel 3): Faith Christian Church. Paul Shirek.
0230 WHR (Angel 5): Lester Sumrall Teaching Series. The head of the Christian Center Church teaches.
0231 Canada, RCI Montreal: Earth Watch. The magazine on environment, science and ecology matters.
0250 Vatican State, Vatican Radio: With Heart and Mind. How this week's liturgical readings apply to our everyday lives.
0258 Vatican State, Vatican Radio: On-the-Air. A preview of upcoming programs and broadcast changes and a look behind-the-scenes at Vatican Radio.

### Mondays

0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 WHR (Angel 1/5): USA Radio News. See S 0000.
0200 WHR (Angel 2): Lester Sumrall Teaching Series. See S 0230.
0200 WHR (Angel 3): World Harvest Country Style. See S 0503.
0205 WHR (Angel 1): Music. See S 0205.
0205 WHR (Angel 5): Radio Free America (live). Tom Valentine hosts this talk/interview program.
0207 Canada, RCI Montreal: The Arts in Canada. See S 0606.
0230 WHR (Angel 3): The Voice of Power. RW Schambach preaches from Tyler, Texas.
0231 Canada, RCI Montreal: The Make Believe Mailbag. See S 1436.
0250 Vatican State, Vatican Radio: And So They Came to Rome. The people who have come to the eternal city over the years.

### Tuesday-Saturday

0200 Canada, RCI Montreal: RCI News. See S 0200.
0200 WHR (Angel 1/3): USA Radio News. See S 0000.
0200 WHR (Angel 2): Let's Talk Health (live). Dr. Kurt Donsbach.
0205 WHR (Angel 1/3/5): Music. See S 0205.
0211 Canada, RCI Montreal: Spectrum. See M 1440.

### Tuesdays

0250 Vatican State, Vatican Radio: A Room with a View of the Vatican. A look at the activities of the Catholic Church in Rome.
0255 Canada, RCI Montreal: News. News from either the Canadian Broadcasting Corporation (CBC) or Radio Canada International (RCI).
0255 Vatican State, Vatican Radio: As Romans Turn. Focusing on out-of-the-way religious and other events in the eternal city.

### Wednesdays

0250 Vatican State, Vatican Radio: The Rome Report. A behind the scenes review of issues currently confronting the church and the world.
0255 Canada, RCI Montreal: News. See T 0255.

### Thursdays

0250 Vatican State, Vatican Radio: The Pope and the People. Recent public statements by the Pope and responses from the man on the street.
0254 Vatican State, Vatican Radio: Pilgrim City. A look at whose been to Rome recently.
0255 Canada, RCI Montreal: News. See T 0255.

### Fridays

0250 Vatican State, Vatican Radio: Then and Now. Whatever happened to yesterday's headlines?
0255 Canada, RCI Montreal: News. See T 0255.

### Saturdays

0205 WHR (Angel 3): Bible Pathway. See S 1220.
0215 WHR (Angel 3): Focus on the Kingdom. Anthony Buzzard from the New Covenant Baptist Church.
0230 WHR (Angel 5): DXing with Cumbre. See S 0000.
0250 Vatican State, Vatican Radio: Echoes of an Era. The Popes in the twentieth century remembered by those who knew them.
0255 Canada, RCI Montreal: News. See T 0255.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0300-0400 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0300-0400 vl | Australia, ABC/Katherine | 5025do | | | |
| 0300-0400 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0300-0400 | Australia, Radio | 9660as | 12080as | 15240as | 15415as |
| | | 15515as | 17580as | 17750as | 21725as |
| 0300-0330 smwfa | Belarus, R Minsk | 6070eu | 7210eu | | |
| 0300-0400 vl | Botswana, Radio | 4820do | 7255do | | |
| 0300-0400 | Bulgaria, Radio | 7375na | 9400na | | |
| 0300-0400 | Canada, CBC N Quebec Svc | 9625do | | | |
| 0300-0400 | Canada, CFRX Toronto | 6070do | | | |
| 0300-0400 | Canada, CFVP Calgary | 6030do | | | |
| 0300-0400 | Canada, CHNX Halifax | 6130do | | | |
| 0300-0400 | Canada, CKZN St John's | 6160do | | | |
| 0300-0400 | Canada, CKZU Vancouver | 6160do | | | |
| 0300-0329 | Canada, Radio Canada Intl | 6155na | 9755na | 9780na | |
| 0300-0356 | China, China Radio Intl | 9690am | | | |
| 0300-0400 | Costa Rica,RF Peace Intl | 6975va | 15050va | | |
| 0300-0305 | Croatia, Croatian Radio | 7280al | 9925na | | |
| 0300-0400 | Cuba, Radio Havana | 6000na | 9820na | 11705na | 13605na |
| 0300-0400 | Ecuador, HCJB | 9745na | 12015na | 21455va | |
| 0300-0330 | Egypt, Radio Cairo | 9475am | | | |
| 0300-0330 | Finland, YLE/R Finland | 9655na | 11665na | | |
| 0300-0345 | Germany, Deutsche Welle | 6045na | 9535na | 9640na | 9700am |
| | | 11750na | | | |
| 0300-0400 | Germany,Overcomer Ministr | 11710af | | | |
| 0300-0400 vl | Guatemala, Radio Cultural | 3300do | | | |
| 0300-0400 | Guyana, GBC/Voice of | 5950do | | | |
| 0300-0400 irreg | Iraq, Radio Iraq Intl | 9685va | 11787va | | |
| 0300-0400 | Japan, Radio/NHK | 17825ca | 21610pa | | |
| 0300-0400 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 0300-0400 vl | Lesotho, Radio | 4800do | | | |
| 0300-0400 | Malaysia, Radio | 7295do | | | |
| 0300-0400 | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0300-0400 | Namibia, NBC | 3270af | 3289af | | |
| 0300-0400 | New Zealand, R NZ Intl | 17675va | | | |
| 0300-0330 | Pakistan, Radio | 6070do | | | |
| 0300-0400 vl | Papua New Guinea, NBC | 9675do | | | |
| 0300-0330 vl | Philippines, R Pilipinas | 11885as | 15120as | 15270as | |
| 0300-0400 | Russia,Voice of Russia WS | 5940na | 7180na | 12020na | 13665na |
| | | 15470na | | | |
| 0300-0330 | S Africa, AWR Africa | 9815af | | | |
| 0300-0330 | S Africa, Channel Africa | 9525af | | | |
| 0300-0400 | Singapore,RCorp Singapore | 6150do | | | |
| 0300-0400 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 0300-0400 | Taiwan, Radio Taipei Intl | 5950na | 9680na | 11745as | 11825as |
| | | 15345as | | | |
| 0300-0330 | Thailand, Radio | 9655am | 11905am | 15460na | |
| 0300-0400 | Uganda, Radio | 4976do | | | |
| 0300-0400 | UK, BBC World Service | 3255af | 5975na | 6005af | 6135am |
| | 6175na | 6190af | 6195eu | 7160af | 9410eu |
| | 11730af | 11760me | 11765af | 11955as | 12095af |
| | 15310as | 15360as | 17760as | 17790as | 21660as |
| 0300-0400 smtwhf | UK, BBC World Service | 15280as | | | |
| 0300-0400 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0300-0400 | USA, KAIJ Dallas TX | 5810na | | | |
| 0300-0400 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0300-0400 vl | USA, KVOH Los Angeles CA | 9975am | | | |
| 0300-0400 | USA, KWHR Naalehu HI | 17510as | | | |
| 0300-0400 | USA, Voice of America | 6035af | 6080af | 7105af | 7290af |
| | | 7340af | 7415af | 9575af | 9885af |
| 0300-0330 mtwh | USA, Voice of America | 4960af | | | |
| 0300-0400 | USA, WBCQ Monticello ME | 7415na | | | |
| 0300-0400 | USA, WEWN Birmingham AL | 5825na | | | |
| 0300-0400 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 0300-0400 | USA, WHRA Greenbush ME | 7580na | | | |
| 0300-0400 | USA, WHRI Noblesville IN | 5745na | 7315sa | | |
| 0300-0400 | USA, WINB Red Lion PA | 11950am | | | |
| 0300-0400 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0300-0400 | USA, WRNO New Orleans LA | 7395na | | | |
| 0300-0400 | USA, WSHB Cypress Crk SC | 5850na | 7535eu | | |
| 0300-0400 | USA, WTJC Newport NC | 9370na | | | |
| 0300-0400 | USA, WWCR Nashville TN | 3215na | 5070na | 5935na | 7435na |
| 0300-0400 | USA, WYFR Okeechobee FL | 6065na | 9505na | | |
| 0300-0310 | Vatican City, Vatican R | 7305am | 9605am | | |
| 0300-0400 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 0300-0400 vl | Zimbabwe, Zimbabwe BC | 3396do | | | |
| 0305-0320 mtwhfa | UK, BBC World Service | 15360as | | | |
| 0310-0315 thfa/vl | Kyrgyzstan, Kyrgyz Radio | 4010do | 4050do | | |
| 0310-0340 | Vatican City, Vatican R | 9660af | | | |
| 0329-0359 sm | Canada, Radio Canada Intl | 6155na | 9755na | 9780na | |
| 0330-0400 | Albania, R Tirana Intl | 6115na | 7160na | | |
| 0330-0400 | Hungary, Radio Budapest | 9835na | | | |
| 0330-0350 vl | Libya, Voice of Africa | 15235va | 15415va | 15435va | |
| 0330-0355 | Moldova, R Moldova Intl | 7500na | | | |
| 0330-0400 vl | Philippines, R Pilipinas | 13770as | 15330as | 17730as | |
| 0330-0357 | Russia,Voice of Russia WS | 7260na | | | |
| 0330-0400 | Sweden, Radio | 9495na | | | |
| 0330-0400 | Tanzania, Radio | 5050af | | | |
| 0330-0400 | UAE, Radio Dubai | 12005na | 13675na | 15400na | 21485na |
| 0330-0357 | Vietnam, Voice of | 7260sa | | | |
| 0340-0350 | Greece, Voice of | 7450na | 9375na | 9420na | 12105na |
| 0345-0400 | Tajikistan, Radio | 7245as | 9905as | 11620as | |
| 0359-0400 | Zambia, Christian Voice | 6065do | | | |

## Selected Programs

### Sundays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Finland, YLE Radio: News/Weather. World and Finnish news, regional weather, a business report, and currency exchange rates.
0300 WHR (Angel 1): USA Radio News. See S 0000.
0300 WHR (Angel 3): Whole Truth Broadcast. Bishop Rapha.
0300 WHR (Angel 5): Politics and Religion (repeat). Irvin Baxter Jr. hosts this call-in program.
0305 Finland, YLE Radio: Capital Cafe. Conversation around the coffeetable with an interesting guest.
0305 WHR (Angel 1): Soul to Soul. Chris Coppernoll.
0306 Canada, RCI Montreal: The Vinyl Cafe. Host Stuart McLean with gossip and music from the neighborhood music store or with a live concert from around Canada.

### Mondays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Finland, YLE Radio: News/Weather. See S 0300.
0300 WHR (Angel 1/2/5): USA Radio News. See S 0000.
0300 WHR (Angel 3): The Sword of the Spirit. Mike Keyes evangelizes from Tucson, Arizona.
0304 Canada, RCI Montreal: Tapestry. A look at the broad range of spiritual and human issues facing people of various cultures and religions.
0305 WHR (Angel 1/2): Music. See S 0205.
0305 WHR (Angel 5): Radio Free America (live). See M 0205.
0308 Finland, YLE Radio: Compass North. A magazine program with reports and features on life in Finland.
0323 Finland, YLE Radio: Nunti Latini. News. The only program on shortwave in Latin.
0330 WHR (Angel 3): Day of Decision. Bob Roman evangelizes from Texas.

### Tuesdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Finland, YLE Radio: News/Weather. See S 0300.
0300 WHR (Angel 1): USA Radio News. See S 0000.
0300 WHR (Angel 2): Call to Decision (live). Butch Paugh.
0300 WHR (Angel 3): USA Radio News. See S 0000.
0300 WHR (Angel 5): Politics and Religion (repeat). See S 0300.
0305 WHR (Angel 1): Music. See S 0205.
0305 WHR (Angel 3): Music. See S 0205.
0308 Finland, YLE Radio: Compass North. See M 0308.
0311 Canada, RCI Montreal: Spectrum. See M 1440.
0314 Finland, YLE Radio: Finnish Press Review. Editorial opinion and reports on Finnish and world events.

### Wednesdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Finland, YLE Radio: News/Weather. See S 0300.
0300 WHR (Angel 1/3): USA Radio News. See S 0000.
0300 WHR (Angel 2): Call to Decision (live). See T 0300.
0300 WHR (Angel 5): Politics and Religion (repeat). See S 0300.
0305 WHR (Angel 1/3): Music. See S 0205.
0308 Finland, YLE Radio: Compass North. See M 0308.
0311 Canada, RCI Montreal: Spectrum. See M 1440.
0314 Finland, YLE Radio: Finnish Press Review. See T 0314.

### Thursdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Finland, YLE Radio: News/Weather. See S 0300.
0300 WHR (Angel 1): USA Radio News. See S 0000.
0300 WHR (Angel 2): Call to Decision (live). See T 0300.
0300 WHR (Angel 3): USA Radio News. See S 0000.
0300 WHR (Angel 5): Politics and Religion (repeat). See S 0300.
0305 WHR (Angel 1/3): Music. See S 0205.
0308 Finland, YLE Radio: Compass North. See M 0308.
0311 Canada, RCI Montreal: Spectrum. See M 1440.
0314 Finland, YLE Radio: Finnish Press Review. See T 0314.

### Fridays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Finland, YLE Radio: News/Weather. See S 0300.
0300 WHR (Angel 1/3): USA Radio News. See S 0000.
0300 WHR (Angel 2): Call to Decision (live). See T 0300.
0300 WHR (Angel 5): Politics and Religion (repeat). See S 0300.
0305 WHR (Angel 1/3): Music. See S 0205.
0308 Finland, YLE Radio: Compass North. See M 0308.
0311 Canada, RCI Montreal: Spectrum. See M 1440.
0314 Finland, YLE Radio: Finnish Press Review. See T 0314.

### Saturdays

0300 Canada, RCI Montreal: CBC Radio News. See S 0000.
0300 Finland, YLE Radio: News/Weather. See S 0300.
0300 WHR (Angel 1): USA Radio News. See S 0000.
0300 WHR (Angel 2): Call to Decision (live). See T 0300.
0300 WHR (Angel 3): DXing with Cumbre. See S 0000.
0300 WHR (Angel 5): Politics and Religion (repeat). See S 0300.
0305 WHR (Angel 1): Music. See S 0205.
0306 Finland, YLE Radio: Compass North. See M 0308.
0311 Canada, RCI Montreal: Spectrum. See M 1440.
0313 Finland, YLE Radio: Nunti Latini. See M 0323.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0400-0500 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0400-0500 vl | Australia, ABC/Katherine | 5025do | | | |
| 0400-0500 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0400-0500 | Australia, Radio | 9660as | 12080as | 15240as | 15415as |
| | | 15515as | 17580as | 17750as | 21725as |
| 0400-0430 | Belgium,R Vlaanderen Intl | 11980am | | | |
| 0400-0500 vl | Botswana, Radio | 4820do | 7255do | | |
| 0400-0500 | Canada, CBC N Quebec Svc | 9625do | | | |
| 0400-0500 | Canada, CFRX Toronto | 6070do | | | |
| 0400-0500 | Canada, CFVP Calgary | 6030do | | | |
| 0400-0500 | Canada, CHNX Halifax | 6130do | | | |
| 0400-0500 | Canada, CKZN St John's | 6160do | | | |
| 0400-0500 | Canada, CKZU Vancouver | 6160do | | | |
| 0400-0429 as | Canada, Radio Canada Intl | 9505me | 9645me | | |
| 0400-0429 mtwhf | Canada, Radio Canada Intl | 9535af | 9690af | 11795af | |
| 0400-0457 | China, China Radio Intl | 9560am | 9730am | | |
| 0400-0500 | Costa Rica,RF Peace Intl | 6975va | 15050va | | |
| 0400-0405 | Croatia, Croatian Radio | 7285al | 9925na | | |
| 0400-0500 | Cuba, Radio Havana | 6000na | 9820na | 11705na | 13605na |
| 0400-0427 | Czech Rep, R Prague Intl | 7345na | 7465na | 9435na | |
| 0400-0500 | Ecuador, HCJB | 9745na | 12015na | 21455va | |
| 0400-0445 | Germany, Deutsche Welle | 7280af | 9565af | 9765af | 11785af |
| | | 11965af | | | |
| 0400-0500 | Germany,Overcomer Ministr | 15225na | | | |
| 0400-0500 | Guyana, GBC/Voice of | 5950do | | | |
| 0400-0500 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 0400-0500 vl | Lesotho, Radio | 4800do | | | |
| 0400-0410 vl/m-f | Malawi, MBC | 5993do | | | |
| 0400-0500 | Malaysia, Radio | 7295do | | | |
| 0400-0430 stwhfa | Mexico, Radio Mexico Intl | 9705am | | | |
| 0400-0500 | Namibia, NBC | 3270af | 3289af | | |
| 0400-0500 | New Zealand, R NZ Intl | 17675va | | | |
| 0400-0500 vl | Papua New Guinea, NBC | 9675do | | | |
| 0400-0456 | Romania, R Romania Intl | 9570na | 11830as | 15335as | 17735as |
| 0400-0500 | Russia,Voice of Russia WS | 7125na | 7180na | 12010na | 12020na |
| | | 15470na | 15595na | 17595na | 17660na |
| 0400-0500 | S Africa, Channel Africa | 5955af | | | |
| 0400-0500 | Singapore,RCorp Singapore | 6150do | | | |
| 0400-0430 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 0400-0500 | Switzerland, Swiss R Intl | 9885am | 9905am | | |
| 0400-0430 | Tanzania, Radio | 5050af | | | |
| 0400-0500 | Turkey, Voice of | 6010va | 7240as | 21715as | |
| 0400-0500 | Uganda, Radio | 4976do | | | |
| 0400-0500 | UK, BBC World Service | 3255af | 3955eu | 5975na | 6005af |
| | | 6135am | 6175na | 6190af | 6195eu |
| | | 7160af | 9410eu | 11760me | 11765af |
| | | 11955as | 12095af | 15310as | 15420af |
| | | 15575as | 17760as | 17790as | 21660as |
| 0400-0500 | Ukraine, R Ukraine Intl | 6020va | 9600eu | 9810va | |
| 0400-0500 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0400-0500 | USA, KAIJ Dallas TX | 5810na | | | |
| 0400-0500 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0400-0500 vl | USA, KVOH Los Angeles CA | 9975am | | | |
| 0400-0500 | USA, KWHR Naalehu HI | 17780as | | | |
| 0400-0500 | USA, Voice of America | 6035af | 6080af | 7170af | 7290af |
| | | 7415af | 9575af | 9775af | 9885af |
| 0400-0500 | USA, WBCQ Monticello ME | 7415na | | | |
| 0400-0500 | USA, WEWN Birmingham AL | 5825na | | | |
| 0400-0500 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 0400-0500 | USA, WHRA Greenbush ME | 7580na | | | |
| 0400-0500 | USA, WHRI Noblesville IN | 5745na | 7315sa | | |
| 0400-0500 | USA, WINB Red Lion PA | 11950am | | | |
| 0400-0500 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0400-0500 stwhfa | USA, WRMI/R Miami Intl | 7460na | | | |
| 0400-0500 m | USA, WRMI/R Miami Intl | 7460na | | | |
| 0400-0500 | USA, WRNO New Orleans LA | 7395na | | | |
| 0400-0500 | USA, WSHB Cypress Crk SC | 7535eu | 9840af | 12020af | |
| 0400-0500 | USA, WTJC Newport NC | 9370na | | | |
| 0400-0500 | USA, WWCR Nashville TN | 2390na | 3215na | 5070na | 5935na |
| 0400-0500 | USA, WYFR Okeechobee FL | 6065na | 9505na | 9985na | |
| 0400-0500 | Zambia, Christian Voice | 6065do | | | |
| 0400-0500 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 0400-0500 vl | Zimbabwe, Zimbabwe BC | 3396do | | | |
| 0425-0440 | Italy, RAI Intl | 5975af | 7120af | | |
| 0430-0457 | Czech Rep, R Prague Intl | 9865va | 11600va | | |
| 0430-0455 | Moldova, R Moldova Intl | 7500na | | | |
| 0430-0500 | Netherlands, Radio | 6165na | 9590na | | |
| 0430-0500 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 0430-0500 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 0430-0500 | Nigeria, Radio/Lagos | 3326do | | | |
| 0430-0500 | Swaziland, Trans World R | 3200af | 4775af | | |
| 0455-0500 | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0455-0500 | Nigeria, Voice of | 7255af | 15120va | | |

## Selected Programs

### Sundays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 WHR (Angel 1): The Countdown Magazine (hour 1). See S 0002.
0400 WHR (Angel 2): DXing with Cumbre. See S 0000.
0400 WHR (Angel 3): Gospel Crusade Ministries. Scripture teachings by Roger Headrick and free bible correspondence courses.
0400 WHR (Angel 5): USA Radio News. See S 0000.
0405 Canada, RCI Montreal: Venture Canada. See S 0207.
0405 WHR (Angel 5): Light of the Gospel. Jerry Whiteheart.
0415 WHR (Angel 5): Sold Out for Jesus. Paul Tebbano evangelizes from Cookton Park, New York.
0430 WHR (Angel 2): The Voice of Protestant America. Current event issues which relate to Protestantism.
0430 WHR (Angel 5): Mighty in Power. David Sumrall.
0445 WHR (Angel 5): Glory to Glory. Wesley Thomas.

### Mondays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 WHR (Angel 1/2): USA Radio News. See S 0000.
0400 WHR (Angel 3): USA Radio News. See S 0000.
0400 WHR (Angel 5): DXing with Cumbre. See S 0000.
0405 WHR (Angel 1/3): Music. See S 0205.
0405 WHR (Angel 2): Turn Your Radio On. See S 1604.
0406 Canada, RCI Montreal: The Make Believe Mailbag. See S 1436.
0407 Canada, RCI Montreal: The Make Believe Mailbag. See S 1436.
0430 WHR (Angel 5): Mighty in Power. See S 0430.

### Tuesdays

0400 Canada, RCI Montreal: Program to Africa. See M 0600.
0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 WHR (Angel 1): USA Radio News. See S 0000.
0400 WHR (Angel 3): USA Radio News. See S 0000.
0400 WHR (Angel 5): Bible Pathway. See S 1220.
0405 WHR (Angel 1/3/5): Music. See S 0205.
0411 Canada, RCI Montreal: Spectrum. See M 1440.

### Wednesdays

0400 Canada, RCI Montreal: Program to Africa. See M 0600.
0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 WHR (Angel 1): USA Radio News. See S 0000.
0400 WHR (Angel 3): USA Radio News. See S 0000.
0400 WHR (Angel 5): Bible Pathway. See S 1220.
0405 WHR (Angel 1/3/5): Music. See S 0205.
0411 Canada, RCI Montreal: Spectrum. See M 1440.

### Thursdays

0400 Canada, RCI Montreal: Program to Africa. See M 0600.
0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 WHR (Angel 1): Water of Life. See S 1100.
0400 WHR (Angel 3): USA Radio News. See S 0000.
0400 WHR (Angel 5): Bible Pathway. See S 1220.
0405 WHR (Angel 3/5): Music. See S 0205.
0411 Canada, RCI Montreal: Spectrum. See M 1440.

### Fridays

0400 Canada, RCI Montreal: Program to Africa. See M 0600.
0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 WHR (Angel 1/3): USA Radio News. See S 0000.
0400 WHR (Angel 5): Bible Pathway. See S 1220.
0405 WHR (Angel 1/3/5): Music. See S 0205.
0411 Canada, RCI Montreal: Spectrum. See M 1440.

### Saturdays

0400 Canada, RCI Montreal: RCI News. See S 0200.
0400 WHR (Angel 1/5): USA Radio News. See S 0000.
0400 WHR (Angel 3): The Pat Boone Show. Pat Boone sings.
0405 WHR (Angel 1/5): Music. See S 0205.
0411 Canada, RCI Montreal: Spectrum. See M 1440.
0430 WHR (Angel 5): World Harvest Country Style. See S 0503.

### Hauser's Highlights

**MONGOLIA: VOM**

Schedule for English:
1200-1230 12085 Au
1530-1600 12085 9720 SEAs
2000-2030 12085 9720 Eu
(Fyodor Brazhnikov, Russia, *BC-DX*)

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0500-0600 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0500-0600 vl | Australia, ABC/Katherine | 5025do | | | |
| 0500-0600 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0500-0600 | Australia, Radio | 9660as | 12080as | 15240as | 15515as |
| | | 17580as | 21725as | | |
| 0500-0600 as | Australia, Radio | 15415as | 17750as | | |
| 0500-0600 vl | Botswana, Radio | 4820do | 7255do | | |
| 0500-0600 | Canada, CBC N Quebec Svc | 9625do | | | |
| 0500-0600 | Canada, CFRX Toronto | 6070do | | | |
| 0500-0600 | Canada, CFVP Calgary | 6030do | | | |
| 0500-0600 | Canada, CHNX Halifax | 6130do | | | |
| 0500-0600 | Canada, CKZN St John's | 6160do | | | |
| 0500-0600 | Canada, CKZU Vancouver | 6160do | | | |
| 0500-0600 | Costa Rica,RF Peace Intl | 6975va | 15050va | | |
| 0500-0505 | Croatia, Croatian Radio | 7285al | 9925na | | |
| 0500-0600 | Cuba, Radio Havana | 9550na | 9820na | 9830na | |
| 0500-0600 | Ecuador, HCJB | 9745na | 12015na | 21455va | |
| 0500-0545 | Germany, Deutsche Welle | 6100am | 6120na | 9670na | 11795na |
| 0500-0600 | Guyana, GBC/Voice of | 5950do | | | |
| 0500-0515 | Israel, Kol Israel | 9435va | 11605va | 17535au | |
| 0500-0600 | Japan, Radio/NHK | 6110na | 7230eu | 9835eu | 11715as |
| | | 11760as | 11840pa | 11850pa | 15230va |
| | | 15590as | | | |
| 0500-0600 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 0500-0600 | Kuwait, Radio | 15110as | | | |
| 0500-0600 vl | Lesotho, Radio | 4800do | | | |
| 0500-0600 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 0500-0510 vl/m-f | Malawi, MBC | 5993do | | | |
| 0500-0600 | Malaysia, Radio | 7295do | | | |
| 0500-0600 | Malaysia, RTM Sarawak | 7160do | | | |
| 0500-0600 | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0500-0530 twhfa | Mexico, Radio Mexico Intl | 9705am | | | |
| 0500-0525 | Netherlands, Radio | 6165na | 9590na | | |
| 0500-0600 | New Zealand, R NZ Intl | 17675va | | | |
| 0500-0600 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 0500-0600 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 0500-0600 | Nigeria, Radio/Lagos | 3326do | | | |
| 0500-0600 | Nigeria, Voice of | 7255af | 15120va | | |
| 0500-0600 | North Korea, R Pyongyang | 3560eu | 11710eu | 13790eu | |
| 0500-0504 | Pakistan, Radio | 11725me | 15175me | 17555me | |
| 0500-0600 vl | Papua New Guinea, NBC | 9675do | | | |
| 0500-0600 | Russia,Voice of Russia WS | 7125na | 7180na | 7570as | 12010na |
| | | 12020na | 15470na | 15595na | 17595na |
| | | 17660na | | | |
| 0500-0530 | S Africa, AWR Africa | 6015af | | | |
| 0500-0600 | S Africa, Channel Africa | 15215af | | | |
| 0500-0600 | Singapore,RCorp Singapore | 6150do | | | |
| 0500-0600 vl | Solomon Islands, SIBC | 5020do | | | |
| 0500-0600 | Spain, R Exterior Espana | 6055na | | | |
| 0500-0505 | Swaziland, Trans World R | 3200af | 4775af | | |
| 0500-0530 | Switzerland, Swiss R Intl | 9655eu | | | |
| 0500-0600 | Uganda, Radio | 4976do | | | |
| 0500-0600 | UK, BBC World Service | 3255af | 3955eu | 5975na | 6005af |
| | | 6175am | 6190af | 6195eu | 7160af |
| | | 9410eu | 9740as | 11760me | 11765af |
| | | 11955pa | 12095eu | 15310as | 15360as |
| | | 15420af | 15575as | 17640af | 17760as |
| | | 17790as | 17885af | 21660as | |
| 0500-0600 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0500-0600 | USA, KAIJ Dallas TX | 5810na | | | |
| 0500-0600 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0500-0600 vl | USA, KVOH Los Angeles CA | 9975am | | | |
| 0500-0600 | USA, KWHR Naalehu HI | 17780as | | | |
| 0500-0600 | USA, Voice of America | 5970af | 6035af | 6080af | 7170af |
| | | 7295af | 9700af | 9775af | 11825eu |
| | | 12080af | 15205as | | |
| 0500-0600 | USA, WBCQ Monticello ME | 7415na | | | |
| 0500-0600 | USA, WEWN Birmingham AL | 5825na | | | |
| 0500-0600 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 0500-0600 | USA, WHRA Greenbush ME | 7435af | | | |
| 0500-0600 | USA, WHRI Noblesville IN | 5745na | 7315sa | | |
| 0500-0600 | USA, WINB Red Lion PA | 11950am | | | |
| 0500-0600 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0500-0600 | USA, WRMI/R Miami Intl | 7460na | | | |
| 0500-0600 | USA, WRNO New Orleans LA | 7395na | | | |
| 0500-0600 | USA, WSHB Cypress Crk SC | 7535eu | 9840af | 12020af | |
| 0500-0600 | USA, WTJC Newport NC | 9370na | | | |
| 0500-0505 | USA, WWCR Nashville TN | 2390na | 5070na | 5935na | |
| 0500-0505 as | USA, WWCR Nashville TN | 3210na | | | |
| 0500-0505 mtwhf | USA, WWCR Nashville TN | 3215na | | | |
| 0500-0600 | USA, WYFR Okeechobee FL | 5985na | 9985na | 11550eu | |
| 0500-0530 | Vatican City, Vatican R | 9660af | 11625af | 15570af | |
| 0500-0600 | Zambia, Christian Voice | 6065do | | | |
| 0500-0600 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 0500-0530 vl | Zimbabwe, Zimbabwe BC | 3396do | | | |
| 0505-0600 | Swaziland, Trans World R | 3200af | 4775af | 9500af | |
| 0505-0600 | USA, WWCR Nashville TN | 2390na | 3210na | 5070na | 5935na |
| 0515-0555 vl | Honduras, HRMI | 5890am | | | |
| 0520-0600 vl | Ghana, Ghana BC Corp | 3366do | 4915do | | |
| 0530-0600 | Austria, R Austria Intl | 6015na | 6155va | 13730na | 15410eu |
| 0530-0600 | Kiribati, Radio | 9810do | | | |
| 0530-0600 a | Kyrgyzstan, Kyrgyz Radio | 4010do | 4050do | | |
| 0530-0600 | Thailand, Radio | 9655eu | 11905eu | 15115eu | |
| 0530-0600 | UAE, Radio Dubai | 15435au | 17830au | 21605au | 21700au |
| 0530-0600 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |

## Selected Programs

### Sundays

0500 WHR (Angel 1): The Countdown Magazine (hour 2). See S 0002.
0500 WHR (Angel 2): USA Radio News. See S 0000.
0500 WHR (Angel 3): Breakthrough. Rod Parsley conducts services from the World Harvest Church in Columbus, OH.
0500 WHR (Angel 5): Word of Faith. RP House.
0503 WHR (Angel 2): World Harvest Country Style. Joe Brashier plays country music with a Christian slant.
0530 WHR (Angel 2): DXing with Cumbre. See S 0000.
0530 WHR (Angel 5): Music. See S 0205.

### Mondays

0500 WHR (Angel 1): USA Radio News. See S 0000.
0500 WHR (Angel 3): Shepherd's Chapel. Arnold Murray's international outreach.
0500 WHR (Angel 5): Christian Conduit. Dan Cary evangelizes from Missouri.
0505 WHR (Angel 1): Music. See S 0205.
0515 WHR (Angel 5): The Radio Bible Hour. Dr. J. Harold Smith has been preaching on the radio since 1935.
0530 WHR (Angel 5): Midnight Cry. C. Parker Thomas evangelizes from Southern Pines, North Carolina.
0545 WHR (Angel 5): Moments in Bible Prophecy. Raymond Shockley teaches from the Book of Revelations.

### Tuesdays

0500 WHR (Angel 1): USA Radio News. See S 0000.
0500 WHR (Angel 2): The Prophecy Club. See M 0030.
0500 WHR (Angel 3): Shepherd's Chapel. See M 0500.
0500 WHR (Angel 5): Christian Conduit. See M 0500.
0505 WHR (Angel 1): Music. See S 0205.
0515 WHR (Angel 5): The Radio Bible Hour. See M 0515.
0530 WHR (Angel 2): Music. See S 0205.
0530 WHR (Angel 5): Midnight Cry. See M 0530.
0545 WHR (Angel 5): Moments in Bible Prophecy. See M 0545.

### Wednesdays

0500 WHR (Angel 1): USA Radio News. See S 0000.
0500 WHR (Angel 2): The Prophecy Club. See M 0030.
0500 WHR (Angel 3): Shepherd's Chapel. See M 0500.
0500 WHR (Angel 5): Christian Conduit. See M 0500.
0505 WHR (Angel 1): Music. See S 0205.
0515 WHR (Angel 5): The Radio Bible Hour. See M 0515.
0530 WHR (Angel 2): Music. See S 0205.
0530 WHR (Angel 5): Midnight Cry. See M 0530.
0545 WHR (Angel 5): Moments in Bible Prophecy. See M 0545.

### Thursdays

0500 WHR (Angel 1): USA Radio News. See S 0000.
0500 WHR (Angel 2): The Prophecy Club. See M 0030.
0500 WHR (Angel 3): Shepherd's Chapel. See M 0500.
0500 WHR (Angel 5): Christian Conduit. See M 0500.
0505 WHR (Angel 1): Music. See S 0205.
0515 WHR (Angel 5): The Radio Bible Hour. See M 0515.
0530 WHR (Angel 2): Music. See S 0205.
0530 WHR (Angel 5): Midnight Cry. See M 0530.
0545 WHR (Angel 5): Moments in Bible Prophecy. See M 0545.

### Fridays

0500 WHR (Angel 1): USA Radio News. See S 0000.
0500 WHR (Angel 2): The Prophecy Club. See M 0030.
0500 WHR (Angel 3): Shepherd's Chapel. See M 0500.
0500 WHR (Angel 5): Christian Conduit. See M 0500.
0505 WHR (Angel 1): Music. See S 0205.
0515 WHR (Angel 5): The Radio Bible Hour. See M 0515.
0530 WHR (Angel 2): Music. See S 0205.
0530 WHR (Angel 5): Midnight Cry. See M 0530.
0545 WHR (Angel 5): Moments in Bible Prophecy. See M 0545.

### Saturdays

0500 WHR (Angel 1): USA Radio News. See S 0000.
0500 WHR (Angel 2): The Prophecy Club. See M 0030.
0500 WHR (Angel 3): USA Radio News. See S 0000.
0500 WHR (Angel 5): The Call to Worship. See S 1430.
0505 WHR (Angel 1): Music. See S 0205.
0505 WHR (Angel 3): Irish Sports Report. A Notre Dame football update.
0530 WHR (Angel 2): Music. See S 0205.
0530 WHR (Angel 3): Walking in Power. Brother Pronk discusses Christian teaching from Florida.
0530 WHR (Angel 5): The Sword of the Spirit. See M 0300.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0600-0700 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0600-0700 vl | Australia, ABC/Katherine | 5025do | | | |
| 0600-0700 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0600-0700 | Australia, Radio | 9660as | 12080as | 15240as | 15415as |
| | | 15515as | 17580as | 17750as | 21725as |
| 0600-0700 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 0600-0700 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 0600-0700 | Canada, CFRX Toronto | 6070do | | | |
| 0600-0700 | Canada, CFVP Calgary | 6030do | | | |
| 0600-0700 | Canada, CHNX Halifax | 6130do | | | |
| 0600-0700 | Canada, CKZN St John's | 6160do | | | |
| 0600-0700 | Canada, CKZU Vancouver | 6160do | | | |
| 0600-0629 as | Canada, Radio Canada Intl | 5960na | 6090va | 6150eu | 9670na |
| | | 9780af | 11905af | | |
| 0600-0629 mtwhf | Canada, Radio Canada Intl | 11710af | 13690af | 15535af | |
| 0600-0700 | Costa Rica,RF Peace Intl | 6975va | 15050va | | |
| 0600-0605 | Croatia, Croatian Radio | 11880au | 13820al | | |
| 0600-0700 | Cuba, Radio Havana | 9550na | 9820na | 9830na | |
| 0600-0700 | Ecuador, HCJB | 9745na | 12015na | 21455va | |
| 0600-0645 | Germany, Deutsche Welle | 6140eu | 7225af | 9565af | 11785af |
| | | 17820as | 21695as | | |
| 0600-0700 | Germany,Overcomer Ministr | 13810au | | | |
| 0600-0700 vl | Ghana, Ghana BC Corp | 3366do | 4915do | | |
| 0600-0700 | Guyana, GBC/Voice of | 5950do | | | |
| 0600-0700 vl | Italy, IRRS | 3985va | | | |
| 0600-0700 | Japan, Radio/NHK | 7230eu | 9835eu | 11740as | 11840as |
| | | 11850pa | | | |
| 0600-0700 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 0600-0700 | Kiribati, Radio | 9810do | | | |
| 0600-0700 | Kuwait, Radio | 15110as | | | |
| 0600-0700 vl | Lesotho, Radio | 4800do | | | |
| 0600-0700 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 0600-0700 | Malaysia, Radio | 7295do | | | |
| 0600-0700 | Malaysia, RTM Sarawak | 7160do | | | |
| 0600-0700 | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0600-0700 | Namibia, NBC | 7165af | | | |
| 0600-0700 | New Zealand, R NZ Intl | 17675va | | | |
| 0600-0700 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 0600-0700 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 0600-0700 | Nigeria, Radio/Lagos | 3326do | | | |
| 0600-0700 | Nigeria, Voice of | 7255af | 15120va | | |
| 0600-0700 vl | Papua New Guinea, NBC | 9675do | | | |
| 0600-0641 | Romania, R Romania Intl | 9530na | 11830na | | |
| 0600-0700 | Russia,Voice of Russia WS | 15460au | 15470au | 15525au | 17570au |
| | | 21790au | | | |
| 0600-0630 | S Africa, Channel Africa | 15215af | | | |
| 0600-0700 | Sierra Leone, SLBS | 3316do | | | |
| 0600-0700 | Singapore,RCorp Singapore | 6150do | | | |
| 0600-0700 vl | Solomon Islands, SIBC | 5020do | | | |
| 0600-0605 | Swaziland, Trans World R | 4775af | 9500af | | |
| 0600-0630 | Switzerland, Swiss R Intl | 9655eu | | | |
| 0600-0700 | UK, BBC World Service | 3955eu | 6005af | 6175am | 6190af |
| | | 6195eu | 7160af | 9410eu | 9580pa |
| | | 9740as | 11760me | 11765af | 11940af |
| | | 11955pa | 12095eu | 15310as | 15360as |
| | | 15420af | 15575as | 17640af | 17760as |
| | | 17790as | 17885af | 21660as | |
| 0600-0700 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0600-0700 | USA, KAIJ Dallas TX | 5810na | | | |
| 0600-0700 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0600-0700 | USA, KWHR Naalehu HI | 17780as | | | |
| 0600-0700 | USA, Voice of America | 5970af | 5995af | 6035af | 6080af |
| | | 7170af | 7295af | 11805af | 11825af |
| | | 11930af | 12080af | 15205as | 15600af |
| 0600-0700 | USA, WBCQ Monticello ME | 7415na | | | |
| 0600-0700 | USA, WEWN Birmingham AL | 5825na | | | |
| 0600-0700 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 0600-0700 | USA, WHRA Greenbush ME | 7435af | | | |
| 0600-0700 | USA, WHRI Noblesville IN | 5745na | 7315sa | | |
| 0600-0700 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0600-0700 | USA, WRMI/R Miami Intl | 7460na | | | |
| 0600-0700 | USA, WRNO New Orleans LA | 7395na | | | |
| 0600-0700 | USA, WSHB Cypress Crk SC | 7535af | | | |
| 0600-0700 | USA, WTJC Newport NC | 9370na | | | |
| 0600-0700 | USA, WWCR Nashville TN | 2390na | 3210na | 5070na | 5935na |
| 0600-0700 | USA, WYFR Okeechobee FL | 5985na | 7355eu | | |
| 0600-0700 vl | Vanuatu, Radio | 4960do | | | |
| 0600-0620 | Vatican City, Vatican R | 4005eu | 5880eu | 7250eu | |
| 0600-0700 | Yemen, Rep of Yemen Radio | 9780me | | | |
| 0600-0700 | Zambia, Christian Voice | 9865do | | | |
| 0600-0700 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 0600-0700 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 0605-0700 | Swaziland, Trans World R | 4775af | 6100af | 9500af | |
| 0630-0700 | Austria, R Austria Intl | 6015na | | | |
| 0630-0700 | Georgia, Georgian Radio | 11910eu | | | |
| 0630-0700 mtwhfa | Malta, VO Mediterranean | 7155eu | | | |
| 0630-0700 | Vatican City, Vatican R | 11625af | 13765af | 15570af | |
| 0641-0656 | Romania, R Romania Intl | 7105eu | 9510eu | 9530na | 11775eu |
| | | 11830na | 15105eu | | |
| 0645-0700 | Germany, Deutsche Welle | 6140eu | | | |

## Selected Programs

### Sundays

0600 Canada, RCI Montreal: RCI News. See S 0200.
0600 WHR (Angel 1/2): The Joy of Living Broadcast. Ms. Hurst and Ms. Smith evangelize with words and song.
0600 WHR (Angel 3): DXing with Cumbre. See S 0000.
0600 WHR (Angel 5): Music. See S 0205.
0606 Canada, RCI Montreal: The Arts in Canada. David Blair takes a look at Canadian cultural events taking place across the country and around the world.
0615 WHR (Angel 1): Feed the Hungary. A LaSea production.
0615 WHR (Angel 2/3): Taste God's Goodness. Lela Pendergrass teaches about the coming rapture.
0630 WHR (Angel 1/2): The Mercies of God Radio Broadcast. Pastor Peter Notier from Michigan preaches mercy for lost sinners.
0630 WHR (Angel 5): Gospel Crusade Ministries. See S 0400.
0645 WHR (Angel 3): Truth for the World. Churches of Christ spokesman Jim Dearman examines Scripture.

### Mondays

0600 Canada, RCI Montreal: Program to Africa. NEW! Canada programs especially for Africa.
0600 Canada, RCI Montreal: RCI News. See S 0200.
0600 WHR (Angel 1): John Hagee Today. Evangelizing by John Hagee of the Cornerstone Church in San Antonio, TX.
0600 WHR (Angel 2): Blow the Trumpet in Zion. Paul Sorko-Ram.
0600 WHR (Angel 5): New Harvest. Steve Sumrall with a full hour of music and a ministry update.
0605 WHR (Angel 1/2): In Touch. See S 1300.
0610 Canada, RCI Montreal: First Edition. Wojtek Gwiazda provides best way for listeners in Europe, Africa and the Middle East to get updated on the previous day's news and what's happening in Canada.
0655 WHR (Angel 1/2): Bible Pathway. See S 1220.

### Tuesdays

0600 Canada, RCI Montreal: Program to Africa. See M 0600.
0600 Canada, RCI Montreal: RCI News. See S 0200.
0600 WHR (Angel 1): John Hagee Today. See M 0600.
0600 WHR (Angel 2): Blow the Trumpet in Zion. See M 0600.
0600 WHR (Angel 5): New Harvest. See M 0600.
0610 Canada, RCI Montreal: First Edition. See M 0610.
0630 WHR (Angel 1/2): In Touch. See S 1300.
0655 WHR (Angel 1/2): Bible Pathway. See S 1220.

### Wednesdays

0600 Canada, RCI Montreal: Program to Africa. See M 0600.
0600 Canada, RCI Montreal: RCI News. See S 0200.
0600 WHR (Angel 1): John Hagee Today. See M 0600.
0600 WHR (Angel 2): Blow the Trumpet in Zion. See M 0600.
0600 WHR (Angel 5): New Harvest. See M 0600.
0610 Canada, RCI Montreal: First Edition. See M 0610.
0630 WHR (Angel 1/2): In Touch. See S 1300.
0655 WHR (Angel 1/2): Bible Pathway. See S 1220.

### Thursdays

0600 Canada, RCI Montreal: Program to Africa. See M 0600.
0600 Canada, RCI Montreal: RCI News. See S 0200.
0600 WHR (Angel 1): John Hagee Today. See M 0600.
0600 WHR (Angel 2): Blow the Trumpet in Zion. See M 0600.
0600 WHR (Angel 5): New Harvest. See M 0600.
0605 WHR (Angel 2): In Touch. See S 1300.
0610 Canada, RCI Montreal: First Edition. See M 0610.
0630 WHR (Angel 1): In Touch. See S 1300.
0655 WHR (Angel 1/2): Bible Pathway. See S 1220.

### Fridays

0600 Canada, RCI Montreal: Program to Africa. See M 0600.
0600 Canada, RCI Montreal: RCI News. See S 0200.
0600 WHR (Angel 1): John Hagee Today. See M 0600.
0600 WHR (Angel 2): Blow the Trumpet in Zion. See M 0600.
0600 WHR (Angel 5): New Harvest. See M 0600.
0605 WHR (Angel 2): In Touch. See S 1300.
0610 Canada, RCI Montreal: First Edition. See M 0610.
0630 WHR (Angel 1): In Touch. See S 1300.
0655 WHR (Angel 1/2): Bible Pathway. See S 1220.

### Saturdays

0600 Canada, RCI Montreal: RCI News. See S 0200.
0600 WHR (Angel 1/2): DXing with Cumbre. See S 0000.
0600 WHR (Angel 3): DXing with Cumbre. See S 0000.
0600 WHR (Angel 5): Music. See S 0205.
0606 Canada, RCI Montreal: Earth Watch. See S 0231.
0630 WHR (Angel 1/2): World Harvest Country Style. See S 0503.
0630 WHR (Angel 3): The Word of God Broadcast. Sister Polly preaches from the Knoxville House of Faith in Tennessee.
0630 WHR (Angel 5): Biblical Studies Institute. See M 1105.
0645 WHR (Angel 3): Truth for the World. See S 0645.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0700-0800 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0700-0800 vl | Australia, ABC/Katherine | 5025do | | | |
| 0700-0800 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0700-0800 | Australia, Radio | 9660as | 12080as | 15240as | 15415as |
| | | 15515as | 17580as | 17750as | 21725as |
| 0700-0800 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 0700-0800 | Canada, CFRX Toronto | 6070do | | | |
| 0700-0800 | Canada, CFVP Calgary | 6030do | | | |
| 0700-0800 | Canada, CHNX Halifax | 6130do | | | |
| 0700-0800 | Canada, CKZN St John's | 6160do | | | |
| 0700-0800 | Canada, CKZU Vancouver | 6160do | | | |
| 0700-0800 | Costa Rica,RF Peace Intl | 6975va | 15050va | | |
| 0700-0705 | Croatia, Croatian Radio | 11880au | 13820al | | |
| 0700-0800 | Ecuador, HCJB | 9780eu | 11755pa | 21455va | |
| 0700-0800 | Eqt Guinea, Radio Africa | 15186af | | | |
| 0700-0800 | Germany, Deutsche Welle | 6140eu | | | |
| 0700-0800 | Germany, Voice of Hope | 5975eu | | | |
| 0700-0800 s | Germany,Good News World R | 13740au | | | |
| 0700-0715 vl | Ghana, Ghana BC Corp | 3366do | 4915do | | |
| 0700-0800 | Guyana, GBC/Voice of | 5950do | | | |
| 0700-0800 | Italy, IRRS | 7120va | | | |
| 0700-0800 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 0700-0800 | Kiribati, Radio | 9810do | | | |
| 0700-0800 | Kuwait, Radio | 15110as | | | |
| 0700-0800 vl | Lesotho, Radio | 4800do | | | |
| 0700-0715 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 0700-0800 | Malaysia, Radio | 7295do | | | |
| 0700-0800 | Malaysia, RTM Sarawak | 7160do | | | |
| 0700-0800 | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0700-0800 | New Zealand, R NZ Intl | 17675va | | | |
| 0700-0800 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 0700-0800 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 0700-0800 vl | Nigeria, Voice of | 7255af | 15120va | | |
| 0700-0800 | Palau, KHBN/Voice of Hope | 9965as | 9985as | 15725as | |
| 0700-0730 vl | Papua New Guinea, NBC | 9675do | | | |
| 0700-0756 | Romania, R Romania Intl | 17720af | 21480af | | |
| 0700-0800 | Russia,Voice of Russia WS | 15460au | 15470au | 15525au | 17495au |
| | | 17570au | 21790au | | |
| 0700-0800 | Sierra Leone, SLBS | 3316do | | | |
| 0700-0800 | Singapore,RCorp Singapore | 6150do | | | |
| 0700-0730 | Slovakia, R Slovakia Intl | 11990au | 15460au | 21705au | |
| 0700-0800 vl | Solomon Islands, SIBC | 5020do | | | |
| 0700-0705 | Swaziland, Trans World R | 4775af | 6100af | 9500af | |
| 0700-0800 | Taiwan, Radio Taipei Intl | 5950na | | | |
| 0700-0800 | UK, BBC World Service | 6005af | 6175am | 6190af | 6195eu |
| | | 9410eu | 9580pa | 9740as | 11760me |
| | | 11765af | 11940af | 11955pa | 12095eu |
| | | 15310as | 15400af | 15485eu | 15565eu |
| | | 17640eu | 17760as | 17790as | 17830af |
| | | 21660as | | | |
| 0700-0715 as | UK, BBC World Service | 17885af | | | |
| 0700-0800 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0700-0800 | USA, KAIJ Dallas TX | 5810na | | | |
| 0700-0800 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0700-0800 | USA, KWHR Naalehu HI | 11565as | 17780as | | |
| 0700-0800 | USA, WBCQ Monticello ME | 7415na | | | |
| 0700-0800 | USA, WEWN Birmingham AL | 5825na | | | |
| 0700-0800 | USA, WHRA Greenbush ME | 7435af | | | |
| 0700-0800 | USA, WHRI Noblesville IN | 5745na | 7315sa | | |
| 0700-0800 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0700-0800 | USA, WRMI/R Miami Intl | 7460na | | | |
| 0700-0800 | USA, WRNO New Orleans LA | 7395na | | | |
| 0700-0800 | USA, WSHB Cypress Crk SC | 7535af | | | |
| 0700-0800 | USA, WTJC Newport NC | 9370na | | | |
| 0700-0800 | USA, WWCR Nashville TN | 2390na | 3210na | 5070na | 5935na |
| 0700-0800 | USA, WYFR Okeechobee FL | 7355eu | 7520eu | 9985va | |
| 0700-0800 vl | Vanuatu, Radio | 4960do | | | |
| 0700-0800 | Zambia, Christian Voice | 9865do | | | |
| 0700-0800 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 0700-0800 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 0705-0710 mtwhfa | Croatia, Croatian Radio | 6165eu | 7365eu | 9830eu | |
| 0710-0715 s | Kyrgyzstan, Kyrgyz Radio | 4010do | 4050do | | |
| 0715-0800 as | UK, BBC World Service | 15575as | 17885af | | |
| 0725-0800 | Myanmar, Radio | 9730do | | | |
| 0730-0800 | Finland, YLE/R Finland | 9840va | 21670as | | |
| 0730-0800 | Guam, TWR/KTWR | 15200as | | | |
| 0730-0800 vl | Papua New Guinea, NBC | 4890do | | | |
| 0730-0800 | Switzerland, Swiss R Intl | 9885va | 13635af | 17665af | |
| 0730-0745 mtwhf | Vatican City, Vatican R | 4005eu | 5880eu | 6185eu | 7250eu |
| | | 9645eu | 11740eu | 15595af | |
| 0740-0750 | Greece, Voice of | 7425eu | 9375eu | 9420eu | 12105eu |
| | | 17700au | | | |
| 0745-0800 as | Albania, Trans World R | 9870eu | 12070eu | | |
| 0745-0755 as | Monaco, Trans World Radio | 9870eu | | | |
| 0755-0800 mtwhf | ALbania, Trans World R | 9870eu | 12070eu | | |
| 0755-0800 mtwhf | Monaco, Trans World Radio | 9870eu | | | |
| 0800-0900 | Albania, Trans World R | 9870eu | 12070eu | | |
| 0800-0900 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0800-0830 vl | Australia, ABC/Katherine | 5025do | | | |
| 0800-0830 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 0800-0830 | Australia, Radio | 5995as | 9710as | 12080as | 13605as |
| | | 15515as | 21725as | | |
| 0800-0830 as | Australia, Radio | 15415as | 17750as | | |
| 0800-0830 | Belgium,R Vlaanderen Intl | 5985am | | | |
| 0800-0900 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 0800-0900 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 0800-0900 | Canada, CFRX Toronto | 6070do | | | |
| 0800-0900 | Canada, CFVP Calgary | 6030do | | | |
| 0800-0900 | Canada, CHNX Halifax | 6130do | | | |
| 0800-0900 | Canada, CKZN St John's | 6160do | | | |
| 0800-0900 | Canada, CKZU Vancouver | 6160do | | | |
| 0800-0900 | Costa Rica,RF Peace Intl | 15050va | | | |
| 0800-0900 as | Costa Rica,RF Peace Intl | 6975va | | | |
| 0800-0805 | Croatia, Croatian Radio | 13820au | | | |
| 0800-0827 | Czech Rep, R Prague Intl | 11600eu | 15255eu | | |
| 0800-0900 | Ecuador, HCJB | 9780eu | 11755pa | 21455va | |
| 0800-0900 | Eqt Guinea, Radio Africa | 15186af | | | |
| 0800-0900 | Germany, Deutsche Welle | 6140eu | | | |
| 0800-0900 | Germany, Voice of Hope | 5975eu | | | |
| 0800-0900 | Germany,Overcomer Ministr | 13810au | | | |
| 0800-0900 vl | Ghana, Ghana BC Corp | 3366do | 4915do | | |
| 0800-0900 | Guam, TWR/KTWR | 15200as | 15330as | | |
| 0800-0900 | Guyana, GBC/Voice of | 5950do | | | |
| 0800-0900 | Indonesia, Voice of | 9525va | | | |
| 0800-0815 as/vl | Italy, IRRS | 7120va | | | |
| 0800-0900 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 0800-0900 | Kiribati, Radio | 9810do | | | |
| 0800-0900 vl | Lesotho, Radio | 4800do | | | |
| 0800-0900 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 0800-0900 | Malaysia, Radio | 7295do | | | |
| 0800-0825 | Malaysia, Voice of | 6175as | 9750as | 15295as | |
| 0800-0900 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 0800-0900 mtwhf | Monaco, Trans World Radio | 9870eu | | | |
| 0800-0830 | Myanmar, Radio | 9730do | | | |
| 0800-0900 | N Marianas, KFBS Saipan | 11650as | 15380as | | |
| 0800-0900 | New Zealand, R NZ Intl | 17675va | | | |
| 0800-0900 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 0800-0900 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 0800-0900 | Nigeria, Radio/Lagos | 3326do | | | |
| 0800-0900 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 15725as |
| 0800-0900 vl | Papua New Guinea, NBC | 4890do | | | |
| 0800-0900 | Russia,Voice of Russia WS | 9905au | 15460au | 15470au | 17495au |
| | | 21740au | | | |
| 0800-0900 | Sierra Leone, SLBS | 5980do | | | |
| 0800-0900 | Singapore,RCorp Singapore | 6150do | | | |
| 0800-0900 | South Korea, R Korea Intl | 9570au | 13670eu | | |
| 0800-0900 | UK, BBC World Service | 6190af | 9410eu | 9580pa | 9740as |
| | | 11940af | 11955pa | 12095eu | 15310as |
| | 15360as | 15400af | 15485eu | 15565eu | 17640eu |
| | 17760as | 17790as | 17830af | 21660as | 21830as |
| 0800-0900 as | UK, BBC World Service | 15575as | 17885af | | |
| 0800-0900 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0800-0900 | USA, KAIJ Dallas TX | 5810na | | | |
| 0800-0900 | USA, KNLS Anchor Point AK | 9615as | | | |
| 0800-0900 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0800-0900 | USA, KWHR Naalehu HI | 11565as | 17780as | | |
| 0800-0900 | USA, Voice of America | 11995as | 13650as | 15150as | |
| 0800-0900 | USA, WBCQ Monticello ME | 7415na | | | |
| 0800-0900 | USA, WEWN Birmingham AL | 5825na | | | |
| 0800-0900 | USA, WHRA Greenbush ME | 7435af | | | |
| 0800-0900 | USA, WHRI Noblesville IN | 5745na | 7315sa | | |
| 0800-0900 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0800-0900 twhfa | USA, WRMI/R Miami Intl | 7460na | | | |
| 0800-0900 | USA, WRNO New Orleans LA | 7395na | | | |
| 0800-0900 | USA, WSHB Cypress Crk SC | 7535eu | 9845pa | | |
| 0800-0900 | USA, WTJC Newport NC | 9370na | | | |
| 0800-0900 | USA, WWCR Nashville TN | 2390na | 3210na | 5070na | 5935na |
| 0800-0900 vl | Vanuatu, Radio | 4960do | | | |
| 0800-0900 | Zambia, Christian Voice | 9865do | | | |
| 0800-0900 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 0800-0900 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 0804-0820 | Pakistan, Radio | 15530eu | 17835eu | | |
| 0805-0810 s | Croatia, Croatian Radio | 6165eu | 7185eu | 7365eu | 9830eu |
| 0815-0900 as | Italy, IRRS | 7120va | | | |
| 0815-0900 f | Seychelles, FEBA Radio | 15460as | | | |
| 0830-0900 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 0830-0900 vl | Australia, ABC/Katherine | 2485do | | | |
| 0830-0900 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 0830-0900 | Australia, Radio | 5995as | 9710as | 12080as | 13605as |
| | | 15415as | 15515as | 17750as | 21725as |
| 0830-0900 a | Austria, R Austria Intl | 21650as | 21765as | | |
| 0830-0900 | Georgia, Georgian Radio | 11910eu | | | |
| 0830-0900 vl | Solomon Islands, SIBC | 5020do | | | |
| 0830-0900 | Switzerland, Swiss R Intl | 9885au | 13685au | | |

# Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 0900-0920 | Albania, Trans World R | 9870eu | 12070eu | | |
| 0900-1000 | Anguilla,Caribbean Beacon | 6090am | | | |
| 0900-1000 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 0900-1000 vl | Australia, ABC/Katherine | 2485do | | | |
| 0900-1000 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 0900-1000 | Australia, Radio | 11880as | 13605as | 17750as | 21820as |
| 0900-0910 s | Bhutan, Bhutan BC Service | 6030do | | | |
| 0900-1000 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 0900-1000 | Canada, CFRX Toronto | 6070do | | | |
| 0900-1000 | Canada, CFVP Calgary | 6030do | | | |
| 0900-1000 | Canada, CHNX Halifax | 6130do | | | |
| 0900-1000 | Canada, CKZN St John's | 6160do | | | |
| 0900-1000 | Canada, CKZU Vancouver | 6160do | | | |
| 0900-0956 | China, China Radio Intl | 11755pa | 15210pa | | |
| 0900-1000 mtwhf | Costa Rica,RF Peace Intl | 15050va | | | |
| 0900-1000 as | Costa Rica,RF Peace Intl | 6975va | | | |
| 0900-0905 | Croatia, Croatian Radio | 13820au | | | |
| 0900-1000 | Ecuador, HCJB | 11775pa | 21455va | | |
| 0900-1000 | Eqt Guinea, Radio Africa | 15186af | | | |
| 0900-0945 | Germany, Deutsche Welle | 6140eu | 6160pa | 11785af | 15105as |
| | 15410af 15470as | 17800af | 17820as | 17860af | 21600af |
| 0900-1000 | Germany, Voice of Hope | 5975eu | | | |
| 0900-1000 a | Germany,Good News World R | 5995eu | | | |
| 0900-1000 s | Germany,Good News World R | 13800va | | | |
| 0900-0915 | Ghana, Ghana BC Corp | 4915do | 6130do | | |
| 0900-0915 | Guam, TWR/KTWR | 15200as | 15330as | | |
| 0900-1000 | Guyana, GBC/Voice of | 5950do | | | |
| 0900-1000 as/vl | Italy, IRRS | 7120va | | | |
| 0900-1000 | Kenya, Kenya BC Corp | 4935do | | | |
| 0900-0930 | Kiribati, Radio | 9810do | | | |
| 0900-1000 vl | Lesotho, Radio | 4800do | | | |
| 0900-0915 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 0900-1000 | Malaysia, Radio | 7295do | | | |
| 0900-1000 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 0900-1000 s | Malta, VO Mediterranean | 11770eu | | | |
| 0900-0920 mtwhf | Monaco, Trans World Radio | 9870eu | | | |
| 0900-1000 | N Marianas, KFBS Saipan | 9495as | 11650as | 15380as | |
| 0900-1000 | N Marianas, KHBI Saipan | 11725as | | | |
| 0900-1000 | New Zealand, R NZ Intl | 17675va | | | |
| 0900-1000 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 0900-1000 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 0900-1000 | Nigeria, Radio/Lagos | 3326do | | | |
| 0900-1000 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 15725as |
| 0900-1000 vl | Papua New Guinea, NBC | 4890do | | | |
| 0900-1000 | Russia,Voice of Russia WS | 9905au | 15460au | 15470au | 17495au |
| 0900-1000 | Sierra Leone, SLBS | 5980do | | | |
| 0900-1000 | Singapore,RCorp Singapore | 6150do | | | |
| 0900-1000 vl | Solomon Islands, SIBC | 5020do | | | |
| 0900-1000 | Tanzania, Radio | 5050af | | | |
| 0900-1000 | UK, BBC World Service | 6190af | 6195va | 7245as | 9740as |
| | 11760me | 11765as | 11940af | 11945as | 11955pa |
| | 12095eu | 15190sa | 15310as | 15360as | 15400af |
| | 15485eu | 15565eu | 15575as | 17640eu | 17760as |
| | 17790as | 17830af | 17885af | 21470af | 21660as |
| 0900-1000 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 0900-1000 | USA, KAIJ Dallas TX | 5810na | | | |
| 0900-1000 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 0900-1000 | USA, KWHR Naalehu HI | 11565as | 17780as | | |
| 0900-1000 | USA, Voice of America | 11995as | 13650as | 15150as | |
| 0900-1000 | USA, WBCQ Monticello ME | 7415na | | | |
| 0900-1000 | USA, WEWN Birmingham AL | 5825na | | | |
| 0900-1000 | USA, WHRA Greenbush ME | 7435af | | | |
| 0900-1000 | USA, WHRI Noblesville IN | 5745na | 7315na | | |
| 0900-1000 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 0900-1000 twhf | USA, WRMI/R Miami Intl | 7460na | | | |
| 0900-1000 | USA, WRNO New Orleans LA | 7395na | | | |
| 0900-1000 | USA, WSHB Cypress Crk SC | 7535eu | 9455sa | 11725as | |
| 0900-1000 | USA, WTJC Newport NC | 9370na | | | |
| 0900-1000 | USA, WWCR Nashville TN | 2390na | 3210na | 5070na | 5935na |
| 0900-1000 | Zambia, Christian Voice | 9865do | | | |
| 0900-1000 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 0900-1000 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 0915-0930 | Guam, TWR/KTWR | 15330as | | | |
| 0920-0950 s | Albania, Trans World R | 9870eu | 12070eu | | |
| 0920-0930 t | Kyrgyzstan, Kyrgyz Radio | 4010do | 4050do | | |
| 0920-0950 s | Monaco, Trans World Radio | 9870eu | | | |
| 0920-0950 as | UK, BBC World Service | 6195as | 9740as | 11955pa | 15360as |
| | | 17760as | 21660as | | |
| 0930-1000 | Austria, R Austria Intl | 21650as | 21765au | | |
| 0930-1000 | Georgia, Georgian Radio | 11910me | | | |
| 0930-1000 | Guam, TWR/KTWR | 9865as | 15330as | | |
| 0930-1000 | Italy, AWR Europe | 7230eu | | | |
| 0930-1000 | Lithuania, Radio Vilnius | 9710eu | | | |
| 0930-1000 | Netherlands, Radio | 7260as | 9790as | 12065as | |
| 0930-1000 | Philippines, FEBC R Intl | 11635as | | | |
| 0945-1000 | Germany, Deutsche Welle | 6140eu | | | |
| 0953-1000 | Australia, Def Forces R | 11140as | | | |
| 1000-1100 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1000-1030 s | Armenia, Voice of | 4810eu | 15270eu | | |
| 1000-1100 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1000-1100 vl | Australia, ABC/Katherine | 2485do | | | |
| 1000-1100 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1000-1100 | Australia, Radio | 11880as | 13605as | 17750as | 21820as |
| 1000-1100 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 1000-1100 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 1000-1100 | Canada, CFRX Toronto | 6070do | | | |
| 1000-1100 | Canada, CFVP Calgary | 6030do | | | |
| 1000-1100 | Canada, CHNX Halifax | 6130do | | | |
| 1000-1100 | Canada, CKZN St John's | 6160do | | | |
| 1000-1100 | Canada, CKZU Vancouver | 6160do | | | |
| 1000-1056 | China, China Radio Intl | 11755pa | 15210pa | | |
| 1000-1100 mtwhf | Costa Rica,RF Peace Intl | 15050va | | | |
| 1000-1100 as | Costa Rica,RF Peace Intl | 6975va | | | |
| 1000-1029 | Czech Rep, R Prague Intl | 17485af | 21745va | | |
| 1000-1100 | Ecuador, HCJB | 11755pa | 21455va | | |
| 1000-1100 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1000-1100 | Germany, Voice of Hope | 5975eu | | | |
| 1000-1100 | Guam, AWR/KSDA | 11560as | | | |
| 1000-1100 | Guam, TWR/KTWR | 9865as | | | |
| 1000-1100 | Guyana, GBC/Voice of | 5950do | | | |
| 1000-1100 | India, All India Radio | 11585as | 13700as | 15020as | 17840as |
| | | 17845au | 17895au | | |
| 1000-1100 as/vl | Italy, IRRS | 7120va | | | |
| 1000-1100 | Japan, Radio/NHK | 9695as | 11850pa | 15590as | |
| 1000-1100 | Kenya, Kenya BC Corp | 4935do | | | |
| 1000-1100 vl | Lesotho, Radio | 4800do | | | |
| 1000-1100 | Malaysia, Radio | 7295do | | | |
| 1000-1100 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 1000-1100 | N Marianas, KFBS Saipan | 9495as | 11650as | 15380as | |
| 1000-1100 | N Marianas, KHBI Saipan | 11840as | | | |
| 1000-1100 | Netherlands, Radio | 7260as | 9790as | 12065as | |
| 1000-1005 | New Zealand, R NZ Intl | 17675va | | | |
| 1000-1100 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1000-1100 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1000-1100 vl | Nigeria, Voice of | 7255af | 15120va | | |
| 1000-1100 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 15725as |
| 1000-1100 vl | Papua New Guinea, NBC | 4890do | | | |
| 1000-1100 | Philippines, FEBC R Intl | 11635as | | | |
| 1000-1100 | Sierra Leone, SLBS | 5980do | | | |
| 1000-1030 | Singapore, RTE Radio | 11740as | | | |
| 1000-1100 | Singapore,RCorp Singapore | 6150do | | | |
| 1000-1100 vl | Solomon Islands, SIBC | 5020do | | | |
| 1000-1030 | Tanzania, Radio | 5050af | | | |
| 1000-1100 | UK, BBC World Service | 6190af | 6195va | 9740as | 11760me |
| | | 11940af | 11955pa | 12095eu | 15310as |
| | | 15360as | 15485eu | 15565eu | 15575as |
| | | 17640eu | 17760as | 17790as | 17885af |
| | | 21470af | 21660as | | |
| 1000-1100 as | UK, BBC World Service | 15190sa | 15400af | 17830af | |
| 1000-1100 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1000-1100 | USA, KAIJ Dallas TX | 5810na | | | |
| 1000-1100 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 1000-1100 | USA, KWHR Naalehu HI | 9930as | 11565as | | |
| 1000-1100 | USA, Voice of America | 5985pa | 6165am | 7370am | 9590am |
| | | 11720as | 15250as | 15425as | |
| 1000-1100 | USA, WBCQ Monticello ME | 7415na | | | |
| 1000-1100 | USA, WEWN Birmingham AL | 5825na | 7425eu | | |
| 1000-1100 | USA, WHRI Noblesville IN | 6040na | 9495am | | |
| 1000-1100 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1000-1100 mtwhf | USA, WRMI/R Miami Intl | 7460na | | | |
| 1000-1100 | USA, WRNO New Orleans LA | 7395na | | | |
| 1000-1100 | USA, WSHB Cypress Crk SC | 6095am | 9455sa | | |
| 1000-1100 | USA, WTJC Newport NC | 9370na | | | |
| 1000-1100 as | USA, WWBS Macon GA | 11900na | | | |
| 1000-1100 | USA, WWCR Nashville TN | 2390na | 3210na | 5070na | 5935na |
| 1000-1100 | USA, WYFR Okeechobee FL | 5950na | | | |
| 1000-1027 | Vietnam, Voice of | 9840as | 12020as | | |
| 1000-1100 | Zambia, Christian Voice | 9865do | | | |
| 1000-1100 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1000-1100 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 1006-1058 | Australia, Def Forces R | 11140as | | | |
| 1030-1100 | Ethiopia, Radio | 5990do | 7110do | 9705do | |
| 1030-1100 | Malaysia, RTM Sarawak | 7160do | | | |
| 1030-1100 as | Tanzania, Radio | 5050af | | | |
| 1030-1100 | UAE, Radio Dubai | 13675eu | 15370eu | 15395eu | 21605eu |

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 1100-1200 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1100-1200 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1100-1200 vl | Australia, ABC/Katherine | 2485do | | | |
| 1100-1200 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1100-1200 | Australia, Radio | 5995as | 6020as | 9580as | 12080as |
| | | 13605as | 21820as | | |
| 1100-1200 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 1100-1200 | Canada, CFRX Toronto | 6070do | | | |
| 1100-1200 | Canada, CFVP Calgary | 6030do | | | |
| 1100-1200 | Canada, CHNX Halifax | 6130do | | | |
| 1100-1200 | Canada, CKZN St John's | 6160do | | | |
| 1100-1200 | Canada, CKZU Vancouver | 6160do | | | |
| 1100-1200 mtwhf | Costa Rica,RF Peace Intl | 15050va | | | |
| 1100-1200 as | Costa Rica,RF Peace Intl | 6975va | | | |
| 1100-1200 | Ecuador, HCJB | 12005am | 15115am | 21455va | |
| 1100-1200 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1100-1145 | Germany, Deutsche Welle | 6140eu | 15370af | 15410af | 17800af |
| | | 21780af | | | |
| 1100-1200 as | Ghana, Ghana BC Corp | 4915do | 6130do | | |
| 1100-1200 | Guyana, GBC/Voice of | 5950do | | | |
| 1100-1200 | Iran, VOIRI | 13710as | 15255pa | 15430me | 17565as |
| | | 21510as | | | |
| 1100-1200 as/vl | Italy, IRRS | 7120va | | | |
| 1100-1200 | Japan, Radio/NHK | 6120na | 9695as | 15590as | |
| 1100-1200 | Jordan, Radio | 11690eu | | | |
| 1100-1200 | Kenya, Kenya BC Corp | 4935do | | | |
| 1100-1110 fa | Kyrgyzstan, Kyrgyz Radio | 4010do | 4050do | | |
| 1100-1200 vl | Lesotho, Radio | 4800do | | | |
| 1100-1110 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 1100-1200 | Malaysia, Radio | 7295do | | | |
| 1100-1200 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 1100-1200 | N Marianas, KFBS Saipan | 9495as | 11650as | 15380as | |
| 1100-1125 | Netherlands, Radio | 7260as | 9790as | 12065as | |
| 1100-1200 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1100-1200 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1100-1200 vl | Nigeria, Voice of | 7255af | 15120va | | |
| 1100-1200 | North Korea, R Pyongyang | 3560af | 9640af | 9850af | 9975af |
| | | 11335af | 13650va | | |
| 1100-1104 | Pakistan, Radio | 7110do | 11835do | 15530do | 17835eu |
| 1100-1200 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 13840as |
| 1100-1200 vl | Papua New Guinea, NBC | 4890do | | | |
| 1100-1200 | Sierra Leone, SLBS | 5980do | | | |
| 1100-1200 | Singapore,R Singapore Int | 6150as | 9590as | | |
| 1100-1130 vl | Solomon Islands, SIBC | 5020do | | | |
| 1100-1130 | Switzerland, Swiss R Intl | 9535eu | | | |
| 1100-1200 | Switzerland, Swiss R Intl | 9540as | 21770as | | |
| 1100-1200 | Taiwan, Voice of Asia | 7445as | | | |
| 1100-1200 as | Tanzania, Radio | 5050af | | | |
| 1100-1130 mtwhf | UK, BBC Caribbean Report | 6195am | 15220am | | |
| 1100-1200 | UK, BBC World Service | 5965na | 6190af | 6195as | 9580as |
| | 9740as | 11760me | 11940af | 11955as | 12095eu |
| | 15280as 15310as | 15400af | 15485eu | 15565eu | 15575as |
| | 17640eu 17705as | 17790sa | 17830af | 17885af | 21470af |
| 1100-1130 as | UK, BBC World Service | 6195na | 15190sa | 15220am | |
| 1100-1200 | USA, Armee Forces Network | 4278am | 6458am | 12689am | |
| 1100-1200 | USA, KAIJ Dallas TX | 5810na | | | |
| 1100-1200 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 1100-1200 | USA, KWHR Naalehu HI | 9930as | 11565as | | |
| 1100-1200 | USA, Voice of America | 5985pa | 6110as | 9645as | 9760as |
| | | 11705as | 11720as | 15250as | 15425as |
| 1100-1130 mtwhf | USA, Voice of America | 13675af | 15510af | 17650af | 17750af |
| | | 21705af | | | |
| 1100-1200 | USA, WEWN Birmingham AL | 5825na | 15745eu | | |
| 1100-1200 | USA, WHRI Noblesville IN | 6040na | 9495am | | |
| 1100-1200 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1100-1200 | USA, WRNO New Orleans LA | 7395na | | | |
| 1100-1200 | USA, WSHB Cypress Crk SC | 6095am | 11660sa | | |
| 1100-1200 | USA, WTJC Newport NC | 9370na | | | |
| 1100-1200 as | USA, WWBS Macon GA | 11900na | | | |
| 1100-1200 | USA, WWCR Nashville TN | 2390na | 5070na | 5935na | 12160na |
| 1100-1200 | USA, WYFR Okeechobee FL | 5950na | 7355na | 11830na | |
| 1100-1127 | Vietnam, Voice of | 7285as | | | |
| 1100-1200 | Zambia, Christian Voice | 9865do | | | |
| 1100-1200 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1100-1200 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 1104-1120 | Pakistan, Radio | 15530eu | 17835eu | | |
| 1105-1200 occsnal | New Zealand, R NZ Intl | 6105va | | | |
| 1115-1145 | Nepal, Radio | 3230as | 5005as | | |
| 1115-1130 mtwhf | Vatican City, Vatican R | 5880eu | 9645eu | 11740eu | 15595eu |
| | | 21850af | | | |
| 1130-1157 | Czech Rep, R Prague Intl | 11640eu | 21745af | | |
| 1130-1135 | Israel, Kol Israel | 15640va | 17535va | | |
| 1130-1200 vl | Libya, Voice of Africa | 15235va | 15415va | 15435va | |
| 1130-1200 | Netherlands, Radio | 6045eu | 9855eu | | |
| 1130-1200 | South Korea, R Korea Intl | 9650na | | | |
| 1130-1200 as | UK, BBC World Service | 15310as | 17705as | | |
| 1130-1200 f | Vatican City, Vatican R | 15595af | 17515af | | |
| 1145-1200 | Germany, Deutsche Welle | 6140eu | | | |

## Selected Programs

### Sundays

1100 Singapore, R Singapore Intl: News. Singapore, regional and international news.
1100 WHR (Angel 1): Water of Life. Doyle Davidson.
1100 WHR (Angel 2/3): The Water of Life Broadcast. Doyle Davidson preaches from Plano, Texas.
1100 WHR (Angel 4): Open Bible Hour. Jerry Honeycut.
1105 Singapore, R Singapore Intl: The Written Word. Focus on books, writers, journals and magazines.
1115 Singapore, R Singapore Intl: Reflections. Musings on life in Singapore and the region as seen through the eyes of writers, poets, and commentators.
1125 Singapore, R Singapore Intl: Snapshots. Visits to places of interest in Singapore and the region.
1130 Singapore, R Singapore Intl: News. See S 1100.
1130 WHR (Angel 4): Music. See S 0205.
1135 Singapore, R Singapore Intl: Instrumentals. Easy listening music.
1150 Singapore, R Singapore Intl: Business World. A magazine program which analyzes the latest business and financial trends in Singapore and the rest of Asia.

### Monday-Friday

1100 Singapore, R Singapore Intl: News. See S 1100.
1100 WHR (Angel 1/2/3): USA Radio News. See S 0000.
1105 WHR (Angel 1/2): Music. See S 0205.
1130 WHR (Angel 2): Lester Sumrall Teaching Series. See S 0230.
1130 WHR (Angel 3): Bible Pathway. See S 1220.
1135 WHR (Angel 3): The Inside Pitch. Marvin Lau with an inside look at sports and entertainment.
1140 WHR (Angel 3): Family Forum. Jay Kessler.
1145 WHR (Angel 3): Moments in Bible Prophecy. See M 0545.

### Mondays

1105 WHR (Angel 3): Biblical Studies Institute. Bob Tref evangelizes from Rapid City, South Dakota.
1110 Singapore, R Singapore Intl: Business and Market Report. A roundup of financial and business news.
1115 Singapore, R Singapore Intl: Perspective. A feature on regional social issues.
1125 Singapore, R Singapore Intl: Comment. An expert's views on a political, economic, social or cultural issue of interest to Singapore and the region.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Singapore, R Singapore Intl: E-Z Beat. Adult contemporary music program.

### Tuesdays

1105 WHR (Angel 3): Adventures in Odyssey. See S 1330.
1110 Singapore, R Singapore Intl: Business and Market Report. See M 1110.
1115 Singapore, R Singapore Intl: In Transit. Items connected to the travel industry with an Asian focus.
1125 Singapore, R Singapore Intl: On the Line from Silicon Valley. High tech news and trends.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Singapore, R Singapore Intl: E-Z Beat. See M 1135.

### Wednesdays

1105 WHR (Angel 3): Biblical Studies Institute. See M 1105.
1109 Singapore, R Singapore Intl: Business and Market Report. See M 1110.
1115 Singapore, R Singapore Intl: Profile. A personality profile of prominent Singaporeans and foreigners who have made their mark in their chosen fields.
1125 Singapore, R Singapore Intl: Eco-Watch. See M 1335.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Singapore, R Singapore Intl: Classic Gold. A golden-oldies music program.

### Thursdays

1105 WHR (Angel 3): Adventures in Odyssey. See S 1330.
1110 Singapore, R Singapore Intl: Business and Market Report. See M 1110.
1115 Singapore, R Singapore Intl: Living. See S 1335.
1125 Singapore, R Singapore Intl: Potluck. See S 1255.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Singapore, R Singapore Intl: Love Songs. Focusing on love songs through the ages.

### Fridays

1105 WHR (Angel 3): Biblical Studies Institute. See M 1105.
1109 Singapore, R Singapore Intl: Business and Market Report. See M 1110.
1115 Singapore, R Singapore Intl: Frontiers. See S 1245.
1125 Singapore, R Singapore Intl: Indonesia Mediawatch. See M 1235.
1130 Singapore, R Singapore Intl: News/Weather. See S 1200.
1135 Singapore, R Singapore Intl: Classic Gold. See W 1135.

### Saturdays

1100 Singapore, R Singapore Intl: News. See S 1100.
1100 WHR (Angel 1/2): USA Radio News. See S 0000.
1100 WHR (Angel 3): Eternal Good News. Germaine Lockwood of Oklahoma teaches from the Old Testament.
1105 Singapore, R Singapore Intl: Arts Arena. See S 1345.
1105 WHR (Angel 1): Music. See S 0205.
1106 WHR (Angel 2): For the People (repeat). See M 2305.
1115 Singapore, R Singapore Intl: In Transit. See T 1115.
1115 WHR (Angel 3): The Scripture Hour. Evangelist Paul Fleming speaks from Greenville, SC.
1125 Singapore, R Singapore Intl: Comment. See M 1125.
1130 Singapore, R Singapore Intl: News. See S 1100.
1130 WHR (Angel 3): Harvest Christian Center. Sharon Edwards.
1135 Singapore, R Singapore Intl: Instrumentals. See S 1135.
1145 WHR (Angel 3): Asia for Jesus. Bruce Partin.
1150 Singapore, R Singapore Intl: Regional Press Review. See S 1205.

## Frequencies

| | | | | | | |
|---|---|---|---|---|---|---|
| 1200-1300 | Anguilla,Caribbean Beacon | 11775am | | | | |
| 1200-1300 vl | Australia, ABC/Alice Spgs | 2310do | | | | |
| 1200-1300 vl | Australia, ABC/Katherine | 2485do | | | | |
| 1200-1300 vl | Australia, ABC/Tent Creek | 2325do | | | | |
| 1200-1300 | Australia, Radio | 5995as | 6020as | 9580as | 11650as | |
| | | 21820as | | | | |
| 1200-1300 vl | Botswana, Radio | 4820do | 4830do | 7255do | | |
| 1200-1300 | Brazil, R Nacional Bras | 15445am | | | | |
| 1200-1300 | Bulgaria, Radio | 15700eu | 17500eu | | | |
| 1200-1215 | Cambodia, Natl Radio Of | 11940as | | | | |
| 1200-1300 vl | Canada, CBC N Quebec Svc | 9625do | | | | |
| 1200-1300 | Canada, CFRX Toronto | 6070do | | | | |
| 1200-1300 | Canada, CFVP Calgary | 6030do | | | | |
| 1200-1300 | Canada, CHNX Halifax | 6130do | | | | |
| 1200-1300 | Canada, CKZN St John's | 6160do | | | | |
| 1200-1300 | Canada, CKZU Vancouver | 6160do | | | | |
| 1200-1229 | Canada, Radio Canada Intl | 6150as | 11730as | | | |
| 1200-1300 mtwhf | Canada, Radio Canada Intl | 9640na | 13650na | 17710na | | |
| 1200-1256 | China, China Radio Intl | 6950pa | 7265pa | 9715as | 9945pa | |
| | | 11660as | 11675pa | 15180as | | |
| 1200-1300 | Costa Rica,RF Peace Intl | 15050va | | | | |
| 1200-1300 | Ecuador, HCJB | 12005am | 15115am | 21455va | | |
| 1200-1300 | Eqt Guinea, Radio Africa | 15186af | | | | |
| 1200-1300 | France, Radio France Intl | 11670as | 15155eu | 15195eu | 15540af | |
| 1200-1300 | Germany, Deutsche Welle | 6140eu | | | | |
| 1200-1300 | Guyana, GBC/Voice of | 5950do | | | | |
| 1200-1230 | Iran, VOIRI | 13710as | 15255pa | 15430me | 17565as | |
| | | 21510as | | | | |
| 1200-1300 | Jordan, Radio | 11690eu | | | | |
| 1200-1220 fa | Kazakhstan, R Almaty | 9620eu | 11840as | | | |
| 1200-1300 | Kenya, Kenya BC Corp | 4935do | | | | |
| 1200-1215 s | Kyrgyzstan, Kyrgyz Radio | 4010do | 4050do | | | |
| 1200-1300 vl | Lesotho, Radio | 4800do | | | | |
| 1200-1300 | Malaysia, Radio | 7295do | | | | |
| 1200-1300 vl | Malaysia,RTM KotaKinabalu | 5980do | | | | |
| 1200-1230 | Mongolia, Voice of | 12085au | | | | |
| 1200-1300 | N Marianas, KFBS Saipan | 11650as | 15380as | | | |
| 1200-1300 | Netherlands, Radio | 6045eu | 9855eu | | | |
| 1200-1300 occsnal | New Zealand, R NZ Intl | 6105va | | | | |
| 1200-1300 vl | Nigeria, Radio/Ibadan | 6050do | | | | |
| 1200-1300 vl | Nigeria, Radio/Kaduna | 4770do | | | | |
| 1200-1300 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 15725as | |
| 1200-1300 m-a/vl | Papua New Guinea, NBC | 4890do | | | | |
| 1200-1300 | Sierra Leone, SLBS | 5980do | | | | |
| 1200-1300 | Singapore,R Singapore Int | 6150as | 9590as | | | |
| 1200-1300 | Taiwan, Radio Taipei Intl | 7130as | 9610au | | | |
| 1200-1300 as | Tanzania, Radio | 5050af | | | | |
| 1200-1300 | UK, BBC World Service | 5965na | 6190af | 6195va | 9515na | |
| | 9580as | 9740as | 11760me | 11940af | 11955as | |
| | 12095eu | 15220am | 15280as | 15310as | 15485af | |
| | 15565eu 15575as | 17640eu | 17830af | 17885af | 21470af | |
| 1200-1300 | Ukraine, R Ukraine Intl | 9870eu | 15520eu | | | |
| 1200-1300 | USA, Armed Forces Network | 4278am | 6458am | 12689am | | |
| 1200-1300 | USA, KAIJ Dallas TX | 5810na | | | | |
| 1200-1300 | USA, KTBN Salt Lk City UT | 7510na | | | | |
| 1200-1300 | USA, KWHR Naalehu HI | 9930as | 11565as | | | |
| 1200-1300 | USA, Voice of America | 6110as | 9645as | 9760as | 9780as | |
| | | 11705as | 11715as | 15425as | | |
| 1200-1300 | USA, WEWN Birmingham AL | 5825na | 15745eu | | | |
| 1200-1300 | USA, WHRI Noblesville IN | 6040na | 9495am | | | |
| 1200-1300 | USA, WJCR Upton KY | 7490na | 13595na | | | |
| 1200-1300 | USA, WRNO New Orleans LA | 7395na | | | | |
| 1200-1300 | USA, WSHB Cypress Crk SC | 6095am | 11660ca | | | |
| 1200-1300 | USA, WTJC Newport NC | 9370na | | | | |
| 1200-1300 | USA, WWCR Nashville TN | 5070na | 5935na | 7435na | 12160na | |
| 1200-1300 | USA, WYFR Okeechobee FL | 5950na | 7355na | 11830na | 11970na | |
| 1200-1230 | Uzbekistan, R Tashkent | 5060as | 5975as | 6025as | 9715as | |
| 1200-1300 | Zambia, Christian Voice | 9865do | | | | |
| 1200-1300 | Zambia, Natl BC Corp | 6165do | 6265do | | | |
| 1200-1300 vl | Zimbabwe, Zimbabwe BC | 5975do | | | | |
| 1204-1216 as | UK, BBC WOrld Service | 6195na | 15220am | | | |
| 1204-1216 mtwhf | UK,BBC Caribbean Report | 6195am | 15220am | | | |
| 1215-1300 | Egypt, Radio Cairo | 17595as | | | | |
| 1220-1220 w | Kazakhstan, R Almaty | 9620eu | 11840eu | | | |
| 1230-1300 | Bangladesh, Bangla Betar | 7185as | 9548as | | | |
| 1230-1300 | Belgium,R Vlaanderen Intl | 9925eu | | | | |
| 1230-1257 | Czech Rep, R Prague Intl | 6055eu | 21745au | | | |
| 1230-1300 | Guam, AWR/KSDA | 15330as | | | | |
| 1230-1300 | Italy, AWR Europe | 7230eu | | | | |
| 1230-1300 | South Korea, R Korea Intl | 9570as | 9640om | | | |
| 1230-1300 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | | |
| 1230-1300 | Sweden, Radio | 18960na | 21810am | | | |
| 1230-1300 | Thailand, Radio | 9655as | 9810as | 11905as | | |
| 1230-1257 | Vietnam, Voice of | 9840as | 12020as | | | |
| 1240-1250 | Greece, Voice of | 17525af | | | | |
| 1240-1300 t | Kazakhstan, R Almaty | 9620eu | 11840eu | | | |

## Selected Programs

### Sundays

1200 Canada, RCI Montreal (Asia): RCI News. News, weather, and sports from Radio Canada International.
1200 Singapore, R Singapore Intl: News/Weather. A five-minute summary.
1200 WHR (Angel 1/2): Breakthrough. See S 0500.
1200 WHR (Angel 4): USA Radio News. See S 0000.
1205 Singapore, R Singapore Intl: Regional Press Review. A review of the major issues discussed in the editorials of the regional papers during the week.
1205 WHR (Angel 4): LeSEA Global Feed the Hungry. World Harvest Radio's fund drive for feeding the hungry around the world.
1207 Canada, RCI Montreal (Asia): The Arts in Canada. David Blair takes a look at Canadian cultural events taking place across the country and around the world.
1215 Singapore, R Singapore Intl: Insight. In-depth analysis of a political or socio-political issue of topical interest.
1220 WHR (Angel 4): Bible Pathway. Rick Hash with five minutes of Bible readings.
1225 Singapore, R Singapore Intl: Indonesia Today. Analysis of topical issues on Asean's biggest member state, Indonesia.
1225 WHR (Angel 4): The Voice of Salvation. William Wilson of the Church of God of Prophecy presents music and inspiration.
1230 Singapore, R Singapore Intl: News. See S 1100.
1230 WHR (Angel 4): Mighty in Power. See S 0430.
1235 Singapore, R Singapore Intl: The Asian Journal. Reports on interesting events around Asia.
1245 Singapore, R Singapore Intl: Frontiers. A magazine program featuring developments in the fields of health, science, information technology, education and the environment.
1255 Singapore, R Singapore Intl: Potluck. Spotlight on food and culinary traditions.

### Monday-Friday

1200 Canada, RCI Montreal: CBC Radio News. See S 0000.
1200 Singapore, R Singapore Intl: News. See S 1100.
1200 WHR (Angel 1): Ever Increasing Faith. Fredrick "K.C." Price evangelizes from Crenshaw Christian Center in Los Angeles.
1200 WHR (Angel 2): USA Radio News. See S 0000.
1205 Singapore, R Singapore Intl: Newsline. An analysis of the news making headlines in Singapore, the region, and the world.
1211 Canada, RCI Montreal (Asia): Spectrum. A weekday magazine program of current affairs, features, and a business report presented by Jim Craig.
1213 Canada, RCI Montreal: Ontario Morning. The third hour of CBC Radio One's wake-up program for people in Southern Ontario. Hosted by Joe Cote with newreader Ted Fairhurst, and sportscaster Bruce Dowbiggin.
1230 Singapore, R Singapore Intl: Business and Market Report. See M 1110.
1230 WHR (Angel 1): The Hour of Courage. Ron Wilson talks politics and the precious metals market.

### Mondays

1220 Singapore, R Singapore Intl: Reflections. See S 1115.
1235 Singapore, R Singapore Intl: Indonesia Mediawatch. Topical issues from the Indonesian media.
1240 Singapore, R Singapore Intl: The Written Word. See S 1105.
1245 Singapore, R Singapore Intl: Reflections. See S 1115.

### Tuesdays

1220 Singapore, R Singapore Intl: Living. See S 1335.
1230 Singapore, R Singapore Intl: Perspective. See M 1115.
1235 Singapore, R Singapore Intl: The Asian Journal. See S 1235.
1245 Singapore, R Singapore Intl: Eco-Watch. See M 1335.
1250 Singapore, R Singapore Intl: Living. See S 1335.

### Wednesdays

1220 Singapore, R Singapore Intl: Comment. See M 1125.
1225 Singapore, R Singapore Intl: Indonesia Today. See S 1225.
1235 Singapore, R Singapore Intl: Frontiers. See S 1245.
1245 Singapore, R Singapore Intl: Snapshots. See S 1125.

### Thursdays

1220 Singapore, R Singapore Intl: Insight. See S 1215.
1235 Singapore, R Singapore Intl: On the Line from Silicon Valley. See T 1125.
1240 Singapore, R Singapore Intl: In Transit. See T 1115.

### Fridays

1220 Singapore, R Singapore Intl: Regional Press Review. See S 1205.
1235 Singapore, R Singapore Intl: Business World. See S 1150.
1245 Singapore, R Singapore Intl: Comment. See M 1125.
1250 Singapore, R Singapore Intl: Limelight. Interviews with entertainers, fashion designers, gourmets, or anyone who has been in the limelight this week.

### Saturdays

1200 Canada, RCI Montreal (Asia): RCI News. See S 1200.
1200 Singapore, R Singapore Intl: News/Weather. See S 1200.
1200 WHR (Angel 1): USA Radio News. See S 0000.
1200 WHR (Angel 4): The Call to Worship. See S 1430.
1205 Singapore, R Singapore Intl: Business World. See S 1150.
1206 Canada, RCI Montreal (Asia): Earth Watch. The magazine on environment, science and ecology matters.
1215 Singapore, R Singapore Intl: Perspective. See M 1115.
1225 Singapore, R Singapore Intl: Indonesia Mediawatch. See M 1235.
1230 Singapore, R Singapore Intl: News. See S 1100.
1230 WHR (Angel 1): The Voice of Power. See M 0230.
1230 WHR (Angel 4): Eva McCowen Ministries. Eva McCowen.
1235 Singapore, R Singapore Intl: Profile. See W 1115.
1245 Singapore, R Singapore Intl: The Written Word. See S 1105.
1255 Singapore, R Singapore Intl: On the Line from Silicon Valley. See T 1125.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 1300-1400 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1300-1400 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1300-1400 vl | Australia, ABC/Katherine | 2485do | | | |
| 1300-1400 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1300-1400 | Australia, Radio | 5995as | 6020as | 9445as | 9580as |
| | | 11650as | 11660as | 21820as | |
| 1300-1400 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 1300-1320 | Brazil, R Nacional Bras | 15445am | | | |
| 1300-1400 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 1300-1400 | Canada, CFRX Toronto | 6070do | | | |
| 1300-1400 | Canada, CFVP Calgary | 6030do | | | |
| 1300-1400 | Canada, CHNX Halifax | 6130do | | | |
| 1300-1400 | Canada, CKZN St John's | 6160do | | | |
| 1300-1400 | Canada, CKZU Vancouver | 6160do | | | |
| 1300-1330 | Canada, Radio Canada Intl | 9640na | 13650na | 17710na | |
| 1300-1400 | China, China Radio Intl | 7405am | 11715pa | 11980as | 15180as |
| 1300-1330 | China, CHina Radio Intl | 6950pa | 7265pa | | |
| 1300-1400 | Costa Rica,RF Peace Intl | 15050va | | | |
| 1300-1400 | Ecuador, HCJB | 12005am | 15115am | 21455va | |
| 1300-1330 | Egypt, Radio Cairo | 17595as | | | |
| 1300-1400 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1300-1329 | Germany, Deutsche Welle | 6140eu | | | |
| 1300-1330 s | Germany, Universal Life | 9955na | | | |
| 1300-1400 a | Germany,Good News World R | 15330as | | | |
| 1300-1400 | Ghana, Ghana BC Corp | 4915do | 6130do | | |
| 1300-1400 | Guyana, GBC/Voice of | 5950do | | | |
| 1300-1400 | Jordan, Radio | 11690eu | | | |
| 1300-1400 | Kenya, Kenya BC Corp | 4935do | | | |
| 1300-1400 | Lebanon, Voice of Hope | 6280me | 11530va | | |
| 1300-1400 | Lebanon, Voice of Hope | 6280me | 11530va | | |
| 1300-1400 vl | Lesotho, Radio | 4800do | | | |
| 1300-1310 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 1300-1400 | Malaysia, Radio | 7295do | | | |
| 1300-1400 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 1300-1400 | N Marianas, KFBS Saipan | 9670as | 11650as | | |
| 1300-1400 | N Marianas, KHBI Saipan | 11550as | | | |
| 1300-1325 | Netherlands, Radio | 6045eu | 9855eu | | |
| 1300-1400 occsnal | New Zealand, R NZ Intl | 6105va | | | |
| 1300-1400 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1300-1400 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1300-1400 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 13840as |
| 1300-1400 vl | Papua New Guinea, NBC | 4890do | | | |
| 1300-1400 | Philippines, FEBC R Intl | 11995as | | | |
| 1300-1355 | Poland, Radio Polonia | 6095eu | 7270eu | 9525eu | 11820eu |
| 1300-1356 | Romania, R Romania Intl | 11940eu | 15335na | 15390eu | 17806na |
| 1300-1400 as | S Africa, Channel Africa | 11720af | 17780af | 21530af | |
| 1300-1400 | Sierra Leone, SLBS | 5980do | | | |
| 1300-1400 | Singapore,R Singapore Int | 6150as | 9590as | | |
| 1300-1400 | South Korea, R Korea Intl | 9570as | 9640om | 13670as | |
| 1300-1400 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 1300-1330 | Switzerland, Swiss R Intl | 9535eu | | | |
| 1300-1400 as | Tanzania, Radio | 5050af | | | |
| 1300-1400 | Uganda, Radio | 4976do | | | |
| 1300-1400 | UK, BBC World Service | 5965na | 5990as | 6190af | 6195va |
| | 9515na | 9590na | 9740as | 11760me | 11940af |
| | 12095eu 15220am | 15310as | 15420af | 15485eu | 15565eu |
| | 15575as 17640eu | 17705as | 17830af | 17885af | 21470af |
| 1300-1400 f | UK, Merlin Network One | 9750eu | 12035eu | 15235eu | |
| 1300-1400 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1300-1400 | USA, KAIJ Dallas TX | 5810na | | | |
| 1300-1400 | USA, KJES Vado NM | 11715na | | | |
| 1300-1400 | USA, KNLS Anchor Point AK | 7365as | | | |
| 1300-1400 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 1300-1400 | USA, KWHR Naalehu HI | 9930as | 11565as | | |
| 1300-1400 | USA, Voice of America | 6110as | 9355as | 9645as | 9760as |
| | | 11705as | 11715as | 15425as | |
| 1300-1400 | USA, WEWN Birmingham AL | 11875na | 15745eu | | |
| 1300-1400 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 1300-1400 | USA, WHRI Noblesville IN | 6040na | 15105am | | |
| 1300-1400 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1300-1400 | USA, WRMI/R Miami Intl | 9955am | | | |
| 1300-1400 | USA, WRNO New Orleans LA | 7395na | | | |
| 1300-1400 | USA, WSHB Cypress Crk SC | 9430na | 9455ca | | |
| 1300-1400 | USA, WTJC Newport NC | 9370na | | | |
| 1300-1400 | USA, WWCR Nashville TN | 5070na | 5935na | 7435na | 15685na |
| 1300-1400 | USA, WYFR Okeechobee FL | 11550as | 11740na | 11830na | 11970na |
| | | 13695na | | | |
| 1300-1400 | Zambia, Christian Voice | 9865do | | | |
| 1300-1400 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1300-1400 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 1305-1310 | Croatia, Croatian Radio | 6165eu | 7185eu | 7365eu | 9830eu |
| 1315-1325 mtwhfa | Bhutan, Bhutan BC Service | 5030do | | | |
| 1315-1400 | Germany, Voice of Hope | 15715as | | | |
| 1330-1400 | Austria, R Austria Intl | 6155eu | 13730am | 21650am | 21765am |
| 1330-1400 | Canada, Radio Canada Intl | 6150as | 9535as | 9640na | 13650na |
| | | 17710na | | | |
| 1330-1400 | Guam, AWR/KSDA | 11705as | | | |
| 1330-1400 | India, All India Radio | 9545as | 11620as | 13710as | |
| 1330-1400 | Serbia, Radio Yugoslavia | 11835au | | | |
| 1330-1400 | Sweden, Radio | 9425va | 17870va | | |
| 1330-1400 | Turkey, Voice of | 15295as | 17815eu | | |
| 1330-1400 | UAE, Radio Dubai | 13630eu | 13675eu | 15395eu | 21605eu |
| 1330-1400 | Uzbekistan, R Tashkent | 5060as | 5975as | 6025as | 9715as |
| | | 11905as | 15295as | 17775as | |
| 1330-1357 | Vietnam, Voice of | 7145eu | 9730eu | | |
| 1345-1400 | Vatican City, Vatican R | 15510au | 17515au | | |

## Selected Programs

### Daily

1300 RCI Montreal: CBC Radio News. See S 0000.
1300 Singapore, R Singapore Intl: News. See S 1100.
1330 RCI Montreal (Asia): RCI News. See S 1200.
1330 Singapore, R Singapore Intl: News. See S 1100.
1355 Singapore, R Singapore Intl: News. See S 1100.

### Sundays

1300 WHR (1): Gospel Crusade Ministries. See S 0400.
1300 WHR (Angel 2): In Touch. The Atlanta Bible-teaching ministry of Charles Stanley.
1300 WHR (Angel 3): Music. See S 0205.
1300 WHR (Angel 4): DXing with Cumbre. See S 0000.
1305 Canada, RCI Montreal: Quirks and Quarks. Bob McDonald with a what's new in science.
1305 Singapore, R Singapore Intl: Friends of the Airwaves. Listener letters and colorful lifestyle snippets.
1330 WHR (1): Faith Mountain Ministries. Vanderbush.
1330 WHR (Angel 3): Christ Gospel Broadcast. BR Hicks of Jeffersonville, Indiana with a Bible lesson.
1330 WHR (Angel 4): Adventures in Odyssey. Lively childrens' dramas by "Focus on the Family".
1335 Canada, RCI Montreal (Asia): The Make Believe Mailbag. Listeners' letters in which host Marc Montgomery answers questions and reads comments on programs and impressions of Canada.
1335 Singapore, R Singapore Intl: Living. A lifestyle magazine that looks at leisure, food, culture, heritage, fashion, travel, and consumer trends.
1345 Singapore, R Singapore Intl: Arts Arena. Visual and performing arts, interviews with key personalities.

### Monday-Friday

1300 WHR (Angel 2): The Voice of Praise. Pastor Kenneth Ivey teaches from the word of God.
1300 WHR (Angel 3): USA Radio News. See S 0000.
1305 WHR (Angel 3): Music. See S 0205.
1313 Canada, RCI Montreal: Ontario Morning. See M 1213.
1315 WHR (Angel 1): Midnight Cry. See M 0530.
1315 WHR (Angel 2): Gospel Assembly Church. Lloyd Goodwin.
1330 WHR (Angel 1): The Radio Bible Hour. See M 0515.
1330 WHR (Angel 2): Christian Conduit. See M 0500.
1339 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
1340 Singapore, R Singapore Intl: Newsline. See M 1205.
1345 WHR (Angel 1): The Inside Pitch. See M 1135.
1345 WHR (Angel 2): Life in the Word. Joyce Meyer offers help by example for everyday living.
1355 Singapore, R Singapore Intl: News. See S 1100.

### Mondays

1305 Singapore, R Singapore Intl: Singapop. A showcase of homegrown Singaporean talents and local songs.
1335 Singapore, R Singapore Intl: Eco-Watch. A capsule on nature and the environment.

### Tuesdays

1305 Singapore, R Singapore Intl: Rhythm in the Sun. A musical showcase of Latin sounds.
1335 Singapore, R Singapore Intl: Snapshots. See S 1125.

### Wednesdays

1305 Singapore, R Singapore Intl: Spin the Globe. A selection of world music.
1335 Singapore, R Singapore Intl: Potluck. See S 1255.

### Thursdays

1305 Singapore, R Singapore Intl: Singapop. See M 1305.
1335 R Singapore Intl: Indonesia Today. See S 1225.

### Fridays

1305 Singapore, R Singapore Intl: Hot Trax. Information about new music releases in Singapore.
1330 WHR (Angel 2): Christian Conduit. See M 0500.
1335 Singapore, R Singapore Intl: Snapshots. See S 1125.

### Saturdays

1300 WHR (Angel 1): Sound Doctrine. RJ Bruno preaches from Indiana.
1300 WHR (Angel 2/4): USA Radio News. See S 0000.
1300 WHR (Angel 3): Faith Mountain Ministries. See S 1330.
1303 (Angel 4): World Harvest Country Style. See S 0503.
1305 R Singapore Intl: Spin the Globe. See W 1305.
1305 WHR (Angel 2): Music. See S 0205.
1311 Canada, RCI Montreal: The House. A weekly program that takes you behind the scenes in the world of Canadian politics.
1330 WHR (Angel 1): DXing with Cumbre. See S 0000.
1330 WHR (Angel 3): Spirit of Truth. Don Young offers words of encouragement and joy.
1330 WHR (Angel 4): Faith Mountain Ministries. See S 1330.
1335 Canada, RCI Montreal (Asia): Venture Canada. David Blair promotes Canadian business ventures.
1335 Singapore, R Singapore Intl: The Film Programme. Developments in the film industry and film reviews.
1340 Singapore, R Singapore Intl: Limelight. See F 1250.
1345 WHR (Angel 3): Taste God's Goodness. See S 0615.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 1400-1500 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1400-1500 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1400-1500 vl | Australia, ABC/Katherine | 2485do | | | |
| 1400-1500 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1400-1500 | Australia, Radio | 5995as | 6180as | 9445as | 9550as |
| | | 9580as | 11650as | 11660as | |
| 1400-1500 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 1400-1500 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 1400-1500 | Canada, CFRX Toronto | 6070do | | | |
| 1400-1500 | Canada, CFVP Calgary | 6030do | | | |
| 1400-1500 | Canada, CHNX Halifax | 6130do | | | |
| 1400-1500 | Canada, CKZN St John's | 6160do | | | |
| 1400-1500 | Canada, CKZU Vancouver | 6160do | | | |
| 1400-1430 mtwhf | Canada, Radio Canada Intl | 9640na | 13650na | 17710na | |
| 1400-1430 s | Canada, Radio Canada Intl | 9640na | 13655na | 17710na | |
| 1400-1457 | China, China Radio Intl | 7405am | 9535as | 9700as | 11675as |
| | | 11825as | 13685af | 15125af | |
| 1400-1500 | Costa Rica,RF Peace Intl | 15050va | | | |
| 1400-1429 | Czech Rep, R Prague Intl | 21745va | | | |
| 1400-1500 | Ecuador, HCJB | 12005am | 15115am | 21455va | |
| 1400-1500 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1400-1500 | France, Radio France Intl | 11610as | 17560va | 17620as | |
| 1400-1500 | Germany, RTE Radio | 15625eu | | | |
| 1400-1430 s | Germany, Universal Life | 9710eu | | | |
| 1400-1500 | Germany, Voice of Hope | 15715as | | | |
| 1400-1500 | Ghana, Ghana BC Corp | 4915do | 6130do | | |
| 1400-1500 | Guyana, GBC/Voice of | 5950do | | | |
| 1400-1500 | India, All India Radio | 9545as | 11620as | 13710as | |
| 1400-1500 | Japan, Radio/NHK | 9505na | 11730as | 11880me | |
| 1400-1500 | Jordan, Radio | 11690eu | | | |
| 1400-1500 | Kenya, Kenya BC Corp | 4935do | | | |
| 1400-1500 | Lebanon, Voice of Hope | 6280me | 11530va | | |
| 1400-1500 vl | Lesotho, Radio | 4800do | | | |
| 1400-1500 | Malaysia, Radio | 7295do | | | |
| 1400-1500 | Malaysia, RTM Sarawak | 7160do | | | |
| 1400-1500 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 1400-1500 | N Marianas, KFBS Saipan | 9465as | 9495as | 9670as | |
| 1400-1500 occsnal | New Zealand, R NZ Intl | 6105va | | | |
| 1400-1500 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1400-1500 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1400-1500 | Oman, R Sultanate of | 15140eu | | | |
| 1400-1415 | Pakistan, Radio | 11570me | 15170me | 15465me | |
| 1400-1500 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 13840as |
| 1400-1500 vl | Papua New Guinea, NBC | 4890do | | | |
| 1400-1500 | Philippines, FEBC R Intl | 11995as | | | |
| 1400-1455 as | S Africa, Channel Africa | 11720af | 17780af | 21530af | |
| 1400-1500 | Sierra Leone, SLBS | 5980do | | | |
| 1400-1500 | Singapore,RCorp Singapore | 6150do | | | |
| 1400-1500 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 1400-1500 | Switzerland, Swiss R Intl | 12010as | 15185as | | |
| 1400-1500 as | Tanzania, Radio | 5050af | | | |
| 1400-1430 | Thailand, Radio | 9530as | 9655as | 11905as | |
| 1400-1430 | Turkey, Voice of | 15295as | 17815eu | | |
| 1400-1500 | Uganda, Radio | 4976do | | | |
| 1400-1500 | UK, BBC World Service | 5990as | 6190af | 6195as | 9515na |
| | | 9590na | 9740as | 11940af | 12095eu |
| | | 15220na | 15310as | 15485eu | 15565eu |
| | | 15575as | 17630as | 17640eu | 17830af |
| | | 17840am | 21470af | 21660af | |
| 1400-1500 a | UK, Merlin Network One | 9605 | 9605eu | 13640eu | 15510eu |
| 1400-1500 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1400-1500 | USA, KAIJ Dallas TX | 13815na | | | |
| 1400-1500 | USA, KJES Vado NM | 11715na | | | |
| 1400-1500 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 1400-1500 | USA, KWHR Naalehu HI | 9930as | 11565as | | |
| 1400-1500 | USA, Voice of America | 6110as | 7125as | 7215as | 9645as |
| | | 9760as | 11705as | 15205as | 15395as |
| | | 15425as | | | |
| 1400-1500 | USA, WEWN Birmingham AL | 11875na | 15745eu | | |
| 1400-1500 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 1400-1500 | USA, WHRI Noblesville IN | 6040na | 15105am | | |
| 1400-1500 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1400-1500 irreg | USA, WMLK Bethel PA | 9465am | | | |
| 1400-1500 s | USA, WRMI/R Miami Intl | 9955am | | | |
| 1400-1500 | USA, WRNO New Orleans LA | 7395na | | | |
| 1400-1500 | USA, WTJC Newport NC | 9370na | | | |
| 1400-1500 | USA, WWCR Nashville TN | 9475na | 12160na | 13845na | 15685na |
| 1400-1500 | USA, WYFR Okeechobee FL | 11550as | 11740na | 11830na | 17760na |
| 1400-1405 | Vatican City, Vatican R | 15500au | 17515au | | |
| 1400-1500 | Zambia, Christian Voice | 9865do | | | |
| 1400-1500 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1400-1500 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 1410-1420 as | Greece, Voice of | 9425eu | 15630eu | | |
| 1415-1420 | Nepal, Radio | 3230as | 5005as | | |
| 1430-1500 | Canada, Radio Canada Intl | 11740va | 17820af | | |
| 1430-1500 mtwhf | Canada, Radio Canada Intl | 9640na | 13650na | 17710na | |
| 1430-1500 a | Canada, Radio Canada Intl | 13655na | | | |
| 1430-1500 | Guam, AWR/KSDA | 11980as | | | |
| 1430-1500 | Guam, TWR/KTWR | 15330as | | | |
| 1430-1500 | Myanmar, Radio | 5985do | | | |
| 1430-1500 | Netherlands, Radio | 12070as | 12090as | 15590as | |
| 1430-1500 | S Africa, RTE Radio | 21745af | | | |
| 1430-1500 | Sweden, Radio | 13800va | 18960na | 21810am | |

## Selected Programs

### Sundays

1400 Canada, RCI Montreal: World Report. Ten minutes of CBC News.
1400 WHR (Angel 1): The Light of Faith Broadcast. Sarita Sherrod.
1400 WHR (Angel 2): Mighty in Power. See S 0430.
1400 WHR (Angel 4): Lester Sumrall Teaching Series. See S 0230.
1411 Canada, RCI Montreal: This Morning (hour 1). David Enright and Avril Benoit co-host the Sunday Edition of this CBC magazine program (hour 1 of 3 hours).
1415 WHR (Angel 1): Music. See S 0205.
1430 Canada, RCI Montreal: RCI News. See S 0200.
1430 WHR (Angel 1): Faith Mountain Ministries. See S 1330.
1430 WHR (Angel 2): The Call to Worship. Bernie Timmerman with services from Zion Chapel, Holland, Michigan.
1430 WHR (Angel 4): Storming the Gates. Steve Sumrall.
1436 Canada, RCI Montreal: The Make Believe Mailbag. A program entirely devoted to listeners' letters in which host Marc Montgomery answers questions and reads comments on programs and impressions of Canada.

### Mondays

1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
1400 WHR (Angel 1): USA Radio News. See S 0000.
1400 WHR (Angel 2): Politics and Religion (repeat). See S 0300.
1404 WHR (Angel 1): Music. See S 0205.
1406 Canada, RCI Montreal: This Morning. David Enright and Avril Benoit co-host this CBC magazine program.
1430 Canada, RCI Montreal: RCI News. See S 0200.
1440 Canada, RCI Montreal: Spectrum. A weekday magazine program of current affairs, features, and a business report presented by Jim Craig.

### Tuesdays

1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
1400 WHR (Angel 1): USA Radio News. See S 0000.
1400 WHR (Angel 2): Politics and Religion (repeat). See S 0300.
1404 WHR (Angel 1): Music. See S 0205.
1406 Canada, RCI Montreal: This Morning. See M 1406.
1430 Canada, RCI Montreal: RCI News. See S 0200.
1440 Canada, RCI Montreal: Spectrum. See M 1440.

### Wednesdays

1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
1400 WHR (Angel 1): USA Radio News. See S 0000.
1400 WHR (Angel 2): The Water of Life Broadcast. See S 1100.
1404 WHR (Angel 1): Music. See S 0205.
1406 Canada, RCI Montreal: This Morning. See M 1406.
1430 Canada, RCI Montreal: RCI News. See S 0200.
1440 Canada, RCI Montreal: Spectrum. See M 1440.

### Thursdays

1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
1400 WHR (Angel 1): USA Radio News. See S 0000.
1400 WHR (Angel 2): Politics and Religion (repeat). See S 0300.
1404 WHR (Angel 1): Music. See S 0205.
1406 Canada, RCI Montreal: This Morning. See M 1406.
1430 Canada, RCI Montreal: RCI News. See S 0200.
1440 Canada, RCI Montreal: Spectrum. See M 1440.

### Fridays

1400 Canada, RCI Montreal: CBC Radio News. See S 0000.
1400 WHR (Angel 1): USA Radio News. See S 0000.
1400 WHR (Angel 2): Politics and Religion (repeat). See S 0300.
1404 WHR (Angel 1): Music. See S 0205.
1406 Canada, RCI Montreal: This Morning. See M 1406.
1430 Canada, RCI Montreal: RCI News. See S 0200.
1440 Canada, RCI Montreal: Spectrum. See M 1440.

### Saturdays

1400 WHR (Angel 1): Listen to Jesus. Clinton and Sarah Outerbach from The Redeeming Love Christian Center of Nanuet, NY.
1400 WHR (Angel 2): Biblical Studies Institute. See M 1105.
1400 WHR (Angel 4): New Life Fellowship. Bob Bailey.
1430 Canada, RCI Montreal: RCI News. See S 0200.
1430 WHR (Angel 1): Eternal Good News. See A 1100.
1430 WHR (Angel 4): DXing with Cumbre. See S 0000.
1437 Canada, RCI Montreal: Venture Canada. See S 0207.
1445 WHR (Angel 1): Calvary's Connection. Paul Furrow.

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 1500-1600 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1500-1600 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1500-1600 vl | Australia, ABC/Katherine | 2485do | | | |
| 1500-1600 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1500-1600 | Australia, Radio | 5995as | 6180as | 9580as | 11650as |
| | | 11660as | | | |
| 1500-1600 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 1500-1600 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 1500-1600 | Canada, CFRX Toronto | 6070do | | | |
| 1500-1600 | Canada, CFVP Calgary | 6030do | | | |
| 1500-1600 | Canada, CHNX Halifax | 6130do | | | |
| 1500-1600 | Canada, CKZN St John's | 6160do | | | |
| 1500-1600 | Canada, CKZU Vancouver | 6160do | | | |
| 1500-1600 | Canada, Radio Canada Intl | 6185as | | | |
| 1500-1600 s | Canada, Radio Canada Intl | 9640na | 13655na | 17710na | |
| 1500-1556 | China, China Radio Intl | 7160as | 9785as | 13685af | 15125af |
| 1500-1600 | Costa Rica,RF Peace Intl | 15050va | | | |
| 1500-1600 | Ecuador, HCJB | 12005am | 15115am | 21455va | |
| 1500-1600 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1500-1600 | Germany, Voice of Hope | 15715as | | | |
| 1500-1600 | Guam, TWR/KTWR | 15330as | | | |
| 1500-1600 | Guyana, GBC/Voice of | 5950do | | | |
| 1500-1530 | Israel, Kol Israel | 15650va | 17535va | | |
| 1500-1600 | Japan, Radio/NHK | 7200as | 9505na | 9750as | 11730as |
| 1500-1600 | Jordan, Radio | 11690eu | | | |
| 1500-1600 | Kenya, Kenya BC Corp | 4935do | | | |
| 1500-1600 | Lebanon, Voice of Hope | 6280me | 11530va | | |
| 1500-1600 vl | Lesotho, Radio | 4800do | | | |
| 1500-1510 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 1500-1600 | Malaysia, Radio | 7295do | | | |
| 1500-1600 | Malaysia, RTM Sarawak | 7160do | | | |
| 1500-1600 vl | Malaysia,RTM KotaKinabalu | 5980do | | | |
| 1500-1530 | Mexico, Radio Mexico Intl | 9705am | | | |
| 1500-1600 | N Marianas, KFBS Saipan | 9465as | 9495as | 9670as | |
| 1500-1600 | Netherlands, Radio | 12070as | 12090as | 15590as | |
| 1500-1600 occsnal | New Zealand, R NZ Intl | 6145va | | | |
| 1500-1600 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1500-1600 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1500-1600 vl | Nigeria, Voice of | 7255af | 15120va | | |
| 1500-1600 | North Korea, R Pyongyang | 3560eu | 9640af | 9975eu | 11335va |
| | | 11735eu | 13650me | | |
| 1500-1600 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | 13840as |
| 1500-1600 vl | Papua New Guinea, NBC | 4890do | | | |
| 1500-1600 | Russia,Voice of Russia WS | 9800as | 9875as | 11500as | 11695as |
| 1500-1530 | S Africa, Channel Africa | 17770af | | | |
| 1500-1600 | Seychelles, FEBA Radio | 11600as | | | |
| 1500-1600 | Sierra Leone, SLBS | 5980do | | | |
| 1500-1600 | Singapore,RCorp Singapore | 6150do | | | |
| 1500-1600 | Sri Lanka, Sri Lanka BC | 6005as | 9730as | 15425as | |
| 1500-1600 as | Tanzania, Radio | 5050af | | | |
| 1500-1600 | Uganda, Radio | 4976do | | | |
| 1500-1600 | UK, BBC World Service | 5975as | 5990as | 6190af | 6195as |
| | | 9410eu | 9515na | 9590na | 9740as |
| | | 11860af | 12095eu | 15220na | 15310as |
| | | 15400af | 15420af | 15485eu | 15565eu |
| | | 17630as | 17830af | 17840am | 21470af |
| | | 21490af | 21660af | | |
| 1500-1600 a | UK, Merlin Network One | 9605eu | 13640eu | 15510eu | |
| 1500-1600 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1500-1600 | USA, KAIJ Dallas TX | 13815na | | | |
| 1500-1600 | USA, KTBN Salt Lk City UT | 7510na | | | |
| 1500-1600 | USA, KWHR Naalehu HI | 9930as | | | |
| 1500-1600 | USA, Voice of America | 7125as | 7215as | 9575as | 9645as |
| | | 15205as | 15395as | | |
| 1500-1600 | USA, WEWN Birmingham AL | 11875na | 15745eu | | |
| 1500-1600 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 1500-1600 | USA, WHRI Noblesville IN | 6040sa | 15105na | | |
| 1500-1600 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1500-1600 irreg | USA, WMLK Bethel PA | 9465am | | | |
| 1500-1600 | USA, WRNO New Orleans LA | 7395na | | | |
| 1500-1600 | USA, WTJC Newport NC | 9370na | | | |
| 1500-1600 | USA, WWCR Nashville TN | 9475na | 12160na | 13845na | 15685na |
| 1500-1600 | USA, WYFR Okeechobee FL | 11830na | 17760na | | |
| 1500-1600 | Zambia, Christian Voice | 9865do | | | |
| 1500-1600 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1500-1600 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 1530-1540 | Bangladesh, Bangla Betar | 4880as | 15520as | | |
| 1530-1600 | Guam, AWR/KSDA | 9355as | 11920as | | |
| 1530-1600 | Iran, VOIRI | 7250as | 11680as | 13605as | 15150as |
| 1530-1600 | Mongolia, Voice of | 9720as | 12085as | | |
| 1530-1600 | Tanzania, Radio | 5050af | | | |
| 1545-1600 sh | Bangladesh, Bangla Betar | 4880as | 15520as | | |
| 1550-1600 | Vatican City, Vatican R | 9865au | 13765au | 15500au | |

## Selected Programs

### Sundays

1500 Canada, RCI Montreal (Asia): CBC Radio News. News, sports, and weather from the Canadian Broadcasting Corporation.
1500 Canada, RCI Montreal: CBC Radio News. See S 0000.
1500 WHR (Angel 1): DXing with Cumbre. See S 0000.
1500 WHR (Angel 2): Faith Mountain Ministries. See S 1330.
1500 WHR (Angel 3/4): USA Radio News. See S 0000.
1505 WHR (Angel 4): Music. See S 0205.
1506 Canada, RCI Montreal: This Morning (hour 2). David Enright and Avril Benoit co-host the Sunday Edition of this CBC magazine program (hour 2 of 3 hours).
1507 Canada, RCI Montreal (Asia): This Morning. David Enright and Avril Benoit co-host this CBC magazine program.
1530 WHR (Angel 1): Music. See S 0205.
1530 WHR (Angel 2): DXing with Cumbre. See S 0000.

### Mondays

1500 Canada, RCI Montreal (Asia): CBC Radio News. See S 1500.
1500 WHR (Angel 1/2): New Harvest (live). See M 0600.
1500 WHR (Angel 3): USA Radio News. See S 0000.
1505 WHR (Angel 3): Music. See S 0205.
1507 Canada, RCI Montreal (Asia): This Morning. See S 1507.
1530 WHR (Angel 3): Lester Sumrall Teaching Series. See S 0230.

### Tuesdays

1500 Canada, RCI Montreal (Asia): CBC Radio News. See S 1500.
1500 WHR (Angel 1/2): New Harvest (live). See M 0600.
1500 WHR (Angel 3): USA Radio News. See S 0000.
1505 WHR (Angel 3): Music. See S 0205.
1507 Canada, RCI Montreal (Asia): This Morning. See S 1507.
1530 WHR (Angel 3): Lester Sumrall Teaching Series. See S 0230.

### Wednesdays

1500 Canada, RCI Montreal (Asia): CBC Radio News. See S 1500.
1500 WHR (Angel 1/2): New Harvest (live). See M 0600.
1500 WHR (Angel 3): USA Radio News. See S 0000.
1505 WHR (Angel 3): Music. See S 0205.
1507 Canada, RCI Montreal (Asia): This Morning. See S 1507.
1530 WHR (Angel 3): Lester Sumrall Teaching Series. See S 0230.

### Thursdays

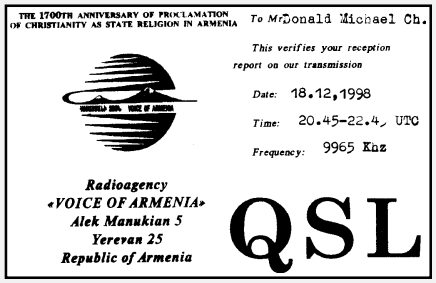
1500 Canada, RCI Montreal (Asia): CBC Radio News. See S 1500.
1500 WHR (Angel 1/2): New Harvest (live). See M 0600.
1500 WHR (Angel 3): USA Radio News. See S 0000.
1505 WHR (Angel 3): Music. See S 0205.
1507 Canada, RCI Montreal (Asia): This Morning. See S 1507.
1530 WHR (Angel 3): Lester Sumrall Teaching Series. See S 0230.

### Fridays

1500 Canada, RCI Montreal (Asia): CBC Radio News. See S 1500.
1500 WHR (Angel 1/2): New Harvest (live). See M 0600.
1500 WHR (Angel 3): USA Radio News. See S 0000.
1505 WHR (Angel 3): Music. See S 0205.
1507 Canada, RCI Montreal (Asia): This Morning. See S 1507.
1530 WHR (Angel 3): Lester Sumrall Teaching Series. See S 0230.

### Saturdays

1500 Canada, RCI Montreal (Asia): CBC Radio News. See S 1500.
1500 WHR (Angel 1/3/4): USA Radio News. See S 0000.
1500 WHR (Angel 2): Sound Doctrine. See A 1300.
1504 WHR (Angel 4): Turn Your Radio On. See S 1604.
1505 WHR (Angel 1): Home Schooling. See A 0105.
1505 WHR (Angel 3): Music. See S 0205.
1507 Canada, RCI Montreal (Asia): The House. A weekly program that takes you behind the scenes in the world of Canadian politics.
1530 WHR (Angel 2): DXing with Cumbre. See S 0000.




*Voice of Armenia QSL sent in by Donald Michael Choleva*

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 1600-1700 | Algeria, R Algiers Intl | 11715af | 15160me | | |
| 1600-1700 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1600-1700 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1600-1700 vl | Australia, ABC/Katherine | 2485do | | | |
| 1600-1700 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1600-1700 | Australia, Radio | 5995as | 6180as | 9500as | 9580as |
| | | 11650as | 11660as | | |
| 1600-1630 | Austria, R Austria Intl | 17865na | | | |
| 1600-1700 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 1600-1700 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 1600-1700 | Canada, CFRX Toronto | 6070do | | | |
| 1600-1700 | Canada, CFVP Calgary | 6030do | | | |
| 1600-1700 | Canada, CHNX Halifax | 6130do | | | |
| 1600-1700 | Canada, CKZN St John's | 6160do | | | |
| 1600-1700 | Canada, CKZU Vancouver | 6160do | | | |
| 1600-1656 | China, China Radio Intl | 7190af | 9565af | | |
| 1600-1700 | Costa Rica,RF Peace Intl | 15050va | | | |
| 1600-1630 | Ecuador, HCJB | 12005am | 15115am | 21455va | |
| 1600-1700 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1600-1700 | Ethiopia, Radio | 7165af | 9560af | | |
| 1600-1700 | France, Radio France Intl | 11615af | 11995af | 12015af | 15210af |
| | | 17850af | | | |
| 1600-1645 | Germany, Deutsche Welle | 6140eu | 6170as | 7225as | 9735af |
| | | 11785as | 15145af | 15380as | 17800af |
| | | 17810am | 21780va | | |
| 1600-1630 s | Germany, Universal Life | 15105af | | | |
| 1600-1630 | Germany, Voice of Hope | 15715as | | | |
| 1600-1700 a | Germany,Good News World R | 15105af | | | |
| 1600-1700 | Germany,Overcomer Ministr | 6010eu | 13810me | | |
| 1600-1700 | Guam, AWR/KSDA | 9355as | 11920as | | |
| 1600-1630 | Guam, TWR/KTWR | 15330as | | | |
| 1600-1700 | Guyana, GBC/Voice of | 5950do | | | |
| 1600-1630 | Iran, VOIRI | 7250as | 11680as | 13605as | 15150as |
| 1600-1700 | Jordan, Radio | 11690eu | | | |
| 1600-1700 | Kenya, Kenya BC Corp | 4935do | | | |
| 1600-1700 | Lebanon, Voice of Hope | 6280me | 11530va | | |
| 1600-1700 vl | Lesotho, Radio | 4800do | | | |
| 1600-1700 | Malaysia, Radio | 7295do | | | |
| 1600-1630 | Mexico, Radio Mexico Intl | 9705am | | | |
| 1600-1700 | N Marianas, KFBS Saipan | 9465as | 9495as | | |
| 1600-1625 | Netherlands, Radio | 12070as | 12090as | 15590as | |
| 1600-1650 occsnal | New Zealand, R NZ Intl | 6145va | | | |
| 1600-1700 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1600-1700 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1600-1700 | Nigeria, Voice of | 7255af | 15120va | | |
| 1600-1630 | Pakistan, Radio | 7230do | 11570me | 15320af | 15465me |
| | | 17510me | 17720af | | |
| 1600-1700 | Palau, KHBN/Voice of Hope | 9955as | 9965as | | |
| 1600-1700 vl | Papua New Guinea, NBC | 4890do | | | |
| 1600-1700 | Russia,Voice of Russia WS | 4940me | 4965me | 7305as | 12055me |
| 1600-1630 | S Africa, Channel Africa | 9525af | | | |
| 1600-1700 | Sierra Leone, SLBS | 5980do | | | |
| 1600-1700 | South Korea, R Korea Intl | 5975om | 9515af | 9870af | |
| 1600-1700 | Swaziland, Trans World R | 9500af | | | |
| 1600-1615 | Switzerland, Swiss R Intl | 12010as | 15185as | | |
| 1600-1700 | Tanzania, Radio | 5050af | | | |
| 1600-1640 | UAE, Radio Dubai | 13630eu | 13675eu | 15395eu | 21605eu |
| 1600-1700 | Uganda, Radio | 4976do | | | |
| 1600-1700 | UK, BBC World Service | 3195as | 5975as | 5990as | 6190af |
| | | 6195as | 7160as | 9410eu | 9515na |
| | | 9740as | 11940af | 12095eu | 15310as |
| | | 15400af | 15565eu | 17630as | 17830af |
| | | 17840am | 21470af | 21660af | |
| 1600-1700 a | UK, Merlin Network One | 3965eu | 13640eu | | |
| 1600-1700 | UK, Merlin Network One | 9655eu | | | |
| 1600-1700 | UK, Merlin Network One | 9655eu | | | |
| 1600-1700 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1600-1700 | USA, KAIJ Dallas TX | 13815na | | | |
| 1600-1700 | USA, KTBN Salt Lk City UT | 15590na | | | |
| 1600-1700 | USA, KWHR Naalehu HI | 9930as | | | |
| 1600-1700 | USA, Voice of America | 6035af | 6110as | 7125as | 7215as |
| | | 9575as | 9645as | 9760as | 11920af |
| | | 12040af | 13710af | 15205as | 15225af |
| | | 15240af | 15395as | | |
| 1600-1700 | USA, WEWN Birmingham AL | 11875na | 13615na | 15745eu | |
| 1600-1700 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 1600-1700 | USA, WHRA Greenbush ME | 17650af | | | |
| 1600-1700 | USA, WHRI Noblesville IN | 13760na | 15105sa | | |
| 1600-1700 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1600-1700 | USA, WRNO New Orleans LA | 7395na | 15420va | | |
| 1600-1700 | USA, WSHB Cypress Crk SC | 18915af | | | |
| 1600-1700 | USA, WTJC Newport NC | 9370na | | | |
| 1600-1700 | USA, WWCR Nashville TN | 9475na | 12160na | 13845na | 15685na |
| 1600-1700 | USA, WYFR Okeechobee FL | 11830na | 15215na | 15695eu | 17510eu |
| | | 17760na | 21525af | | |
| 1600-1610 | Vatican City, Vatican R | 9865au | 13765au | 15500au | |
| 1600-1700 | Zambia, Christian Voice | 4965do | | | |
| 1600-1700 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1600-1630 vl | Zimbabwe, Zimbabwe BC | 5975do | | | |
| 1605-1615 mtwhf | UK, BBC World Service | 5990as | | | |
| 1615-1630 a | UK, BBC World Service | 11860af | | | |
| 1630-1657 | Canada, Radio Canada Intl | 6140as | 7150as | | |
| 1630-1645 | Egypt, Radio Cairo | 11875af | 15255af | | |
| 1630-1700 | Georgia, Georgian Radio | 6180me | | | |
| 1630-1700 s | Seychelles, FEBA Radio | 11605as | | | |
| 1630-1645 a | UK, BBC World Service | 9515na | 11860af | | |
| 1630-1657 | Vietnam, Voice of | 7145eu | 9730eu | | |
| 1630-1700 vl | Zimbabwe, Zimbabwe BC | 4828do | | | |
| 1645-1700 | Egypt, Radio Cairo | 15255af | | | |
| 1645-1700 | Germany, Deutsche Welle | 6140eu | | | |
| 1645-1700 a | UK, BBC World Service | 9515na | | | |
| 1645-1700 smwfa | UK, BBC World Service | 11860af | | | |
| 1650-1700 mtwhf | New Zealand, R NZ Intl | 11675va | | | |

## Selected Programs

### Sundays

1600 Canada, RCI Montreal: RCI News. See S 0200.
1600 WHR (Angel 1): DXing with Cumbre. See S 0000.
1600 WHR (Angel 2): USA Radio News. See S 0000.
1600 WHR (Angel 3/5): USA Radio News. See S 0000.
1604 WHR (Angel 2): Turn Your Radio On. Bill Brasier plays southern gospel music.
1605 WHR (Angel 5): Music. See S 0205.
1606 Canada, RCI Montreal: This Morning (hour 3). David Enright and Avril Benoit co-host the Sunday Edition of this CBC magazine program (hour 3 of 3 hours).
1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
1630 WHR (Angel 1): Storming the Gates. See S 1430.
1637 Canada, RCI Montreal (Asia): The Make Believe Mailbag. See S 1335.

### Monday-Friday

1600 WHR (Angel 1/3/5): USA Radio News. See S 0000.
1600 WHR (Angel 2): Bible Pathway. See S 1220.
1605 WHR (Angel 1): Bible Pathway. See S 1220.
1605 WHR (Angel 3/5): Music. See S 0205.
1610 WHR (Angel 1/2): The Inside Pitch. See M 1135.
1610 WHR (Angel 2): The Voice of Salvation. See S 1225.
1615 WHR (Angel 1): Life in the Word. See M 1345.
1615 WHR (Angel 2): Ever Increasing Faith. See M 1200.
1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
1630 WHR (Angel 1): Music. See S 0205.
1630 WHR (Angel 2): Power Today. See M 0230.
1641 Canada, RCI Montreal (Asia): Spectrum. See M 1211.
1645 WHR (Angel 2): Miracle Revival Hour. David Paul.

### Saturdays

1600 WHR (Angel 1/5): USA Radio News. See S 0000.
1600 WHR (Angel 2): The Message of Love and Victory. Jan Graybill of Tulsa, Oklahoma with music and a Bible lesson.
1600 WHR (Angel 3): UPI News. Five minutes of news from the UPI Radio Network.
1602 WHR (Angel 1): The Countdown Magazine (hour 1). See S 0002.
1604 WHR (Angel 3): Turn Your Radio On. See S 1604.
1605 WHR (Angel 5): Music. See S 0205.
1630 Canada, RCI Montreal (Asia): RCI News. See S 1200.
1633 WHR (Angel 2): Adventures in Odyssey. See S 1330.
1636 Canada, RCI Montreal (Asia): Venture Canada. See A 1335.

### Hauser's Highlights

### INDIA: All India Radio

GOS in English until March 26:

| UT | kHz | | |
|---|---|---|---|
| 1000-1100 | 11585 | 13700 | 15020 |
| | 17485 | 17840 | 17895 |
| 1330-1500 | 9545 | 11620 | 13710 |
| 1745-1945 | 15200 | 15075 | 13750 |
| | 11935 | 11620 | 9950 |
| | 7410 | | |
| 2045-2230 | 7150 | 7410 | 9650 |
| | 9910 | 9950 | 11620 |
| | 11715 | | |
| 2245-0045 | 7410 | 9705 | 9950 |
| | 11620 | 13625 | |

(AIR website via Fyodor Brazhnikov, Russia, *BC-DX*)

# Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 1700-1730 | Afghanistan, VO Shariah | 4774do | 7077do | | |
| 1700-1800 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1700-1800 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1700-1800 vl | Australia, ABC/Katherine | 2485do | | | |
| 1700-1800 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1700-1800 | Australia, Radio | 5995as | 6180as | 9500as | 9580as |
| | | 9660as | 11880as | | |
| 1700-1800 vl | Botswana, Radio | 4820do | 4830do | 7255do | |
| 1700-1800 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 1700-1800 | Canada, CFRX Toronto | 6070do | | | |
| 1700-1800 | Canada, CFVP Calgary | 6030do | | | |
| 1700-1800 | Canada, CHNX Halifax | 6130do | | | |
| 1700-1800 | Canada, CKZN St John's | 6160do | | | |
| 1700-1800 | Canada, CKZU Vancouver | 6160do | | | |
| 1700-1756 | China, China Radio Intl | 7105af | 7405af | 9570af | 9745af |
| 1700-1800 | Costa Rica,RF Peace Intl | 15050va | | | |
| 1700-1727 | Czech Rep, R Prague Intl | 5930eu | 17485af | | |
| 1700-1800 | Egypt, Radio Cairo | 15255af | | | |
| 1700-1800 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1700-1730 | France, Radio France Intl | 11615af | 15210af | | |
| 1700-1800 | Germany, Deutsche Welle | 6140eu | | | |
| 1700-1800 | Germany, Voice of Hope | 11725as | | | |
| 1700-1800 a | Germany,Good News World R | 11795me | | | |
| 1700-1800 | Germany,Overcomer Ministr | 3965eu | | | |
| 1700-1800 vl | Ghana, Ghana BC Corp | 4915do | | | |
| 1700-1800 | Guyana, GBC/Voice of | 5950do | | | |
| 1700-1800 | Japan, Radio/NHK | 9825eu | 12000na | 15355af | |
| 1700-1730 | Jordan, Radio | 11690eu | | | |
| 1700-1800 | Kenya, Kenya BC Corp | 4935do | | | |
| 1700-1800 | Lebanon, Voice of Hope | 6280me | 11530va | | |
| 1700-1800 vl | Lesotho, Radio | 4800do | | | |
| 1700-1800 | Malaysia, Radio | 7295do | | | |
| 1700-1800 | N Marianas, KFBS Saipan | 9465as | | | |
| 1700-1758 mtwh | New Zealand, R NZ Intl | 11675va | | | |
| 1700-1800 vl | Nigeria, Radio/Ibadan | 6070do | | | |
| 1700-1800 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1700-1800 | Nigeria, Radio/Lagos | 3326do | | | |
| 1700-1800 | Palau, KHBN/Voice of Hope | 9955as | 9965as | | |
| 1700-1800 vl | Papua New Guinea, NBC | 4890do | | | |
| 1700-1756 | Romania, R Romania Intl | 9625eu | 11740eu | 11940eu | 15365eu |
| 1700-1800 | Russia,Voice of Russia WS | 5935me | 7445me | 9470me | |
| 1700-1730 | S Africa, Channel Africa | 17870af | | | |
| 1700-1800 | Sierra Leone, SLBS | 5980do | | | |
| 1700-1730 | Swaziland, Trans World R | 9500af | | | |
| 1700-1800 | Tanzania, Radio | 5050af | | | |
| 1700-1800 | Uganda, Radio | 4976do | | | |
| 1700-1800 | UK, BBC World Service | 3255af | 3915af | 5975as | 6005af |
| | | 6190af | 6195eu | 7160as | 9410eu |
| | | 9510as | 9630af | 9740as | 11980me |
| | 12095eu | 15400af | 15420af | 17830af | 17840na |
| 1700-1800 a | Uk, Merlin Network One | 3965eu | 13640eu | | |
| 1700-1800 mtwhf | UK, Merlin Network One | 6185eu | | | |
| 1700-1800 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1700-1800 | USA, KAIJ Dallas TX | 13815na | | | |
| 1700-1800 | USA, KTBN Salt Lk City UT | 15590na | | | |
| 1700-1800 | USA, KWHR Naalehu HI | 9930as | | | |
| 1700-1800 | USA, Voice of America | 6040af | 6110as | 7125as | 7215as |
| | | 9645as | 9760as | 11920af | 12040af |
| | 15205as | 15240af | 15395as | 15445af | 17895af |
| 1700-1800 mtwhf | USA, Voice of America | 5990as | 6045as | 9525as | 9670as |
| | | 9795as | 11955as | 12005as | 15255as |
| 1700-1800 | USA, WEWN Birmingham AL | 11875na | 13615na | 15745eu | |
| 1700-1800 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 1700-1800 | USA, WHRA Greenbush ME | 17650af | | | |
| 1700-1800 | USA, WHRI Noblesville IN | 13760na | 15105na | | |
| 1700-1800 | USA, WINB Red Lion PA | 13800eu | | | |
| 1700-1800 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1700-1800 irreg | USA, WMLK Bethel PA | 9465am | | | |
| 1700-1800 | USA, WRNO New Orleans LA | 7395na | 15420va | | |
| 1700-1800 | USA, WSHB Cypress Crk SC | 18915af | | | |
| 1700-1800 | USA, WTJC Newport NC | 9370na | | | |
| 1700-1800 | USA, WWCR Nashville TN | 9475na | 12160na | 13845na | 15685na |
| 1700-1800 | USA, WYFR Okeechobee FL | 15695eu | 17510eu | | |
| 1700-1800 | Zambia, Christian Voice | 4965do | | | |
| 1700-1800 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1700-1800 vl | Zimbabwe, Zimbabwe BC | 4828do | | | |
| 1715-1800 vl | Libya, Voice of Africa | 15235va | 15415va | 15435va | |
| 1715-1730 | Vatican City, Vatican R | 4005eu | 5880eu | 7250eu | 9645eu |
| | | 15595eu | | | |
| 1720-1750 fa | Armenia, Trans World R | 7375eu | | | |
| 1720-1750 | Monaco, Trans World Radio | 7375as | | | |
| 1730-1800 | Austria, R Austria Intl | 6155va | 9655va | 13710va | 13730va |
| 1730-1800 | Guam, AWR/KSDA | 11560as | 11965as | | |
| 1730-1800 | Netherlands, Radio | 6020af | 11655af | | |
| 1730-1800 | Philippines, R Pilipinas | 11720as | 15190as | 17720as | |
| 1730-1800 | S Africa, AWR Africa | 12130af | | | |
| 1730-1800 | Slovakia, R Slovakia Intl | 5915eu | 6055eu | 7345eu | |
| 1730-1745 | Swaziland, Trans World R | 9500af | | | |
| 1730-1745 mtwh | Swaziland, Trans World R | 3200af | | | |
| 1730-1800 s | UK, BBC World Service | 5985as | 7390as | 9750as | 11660as |
| 1730-1800 | Vatican City, Vatican R | 13765af | 15570af | 17515af | |
| 1745-1800 | Bangladesh, Bangla Betar | 7185eu | 7462eu | 9548eu | 15520eu |
| 1745-1800 | India, All India Radio | 7410eu | 9650af | 9950eu | 11620eu |
| | | 11935af | 13750af | 15075af | 15200af |
| 1745-1800 | Swaziland, Trans World R | 3200af | 9500af | | |
| 1758-1800 f | New Zealand, R NZ Intl | 17675va | | | |
| 1800-1900 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1800-1900 mtwhf | Argentina, RAE | 15345eu | | | |
| 1800-1900 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 1800-1900 vl | Australia, ABC/Katherine | 2485do | | | |
| 1800-1900 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1800-1900 | Australia, Radio | 6080as | 7240as | 9500as | 9580as |
| | | 9600as | 11880as | | |
| 1800-1830 | Azerbaijan, Voice of | 9165eu | | | |
| 1800-1900 | Bangladesh, Bangla Betar | 7185eu | 7462eu | 9548eu | 15520eu |
| 1800-1900 vl | Botswana, Radio | 4820do | 4830do | | |
| 1800-1900 | Canada, CFRX Toronto | 6070do | | | |
| 1800-1900 | Canada, CFVP Calgary | 6030do | | | |
| 1800-1900 | Canada, CHNX Halifax | 6130do | | | |
| 1800-1900 | Canada, CKZN St John's | 6160do | | | |
| 1800-1900 | Canada, CKZU Vancouver | 6160do | | | |
| 1800-1900 | Costa Rica,RF Peace Intl | 15050va | | | |
| 1800-1827 | Czech Rep, R Prague Intl | 5930eu | 7315va | | |
| 1800-1830 | Egypt, Radio Cairo | 15255af | | | |
| 1800-1900 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1800-1900 | Germany, Deutsche Welle | 6140eu | | | |
| 1800-1900 | Germany,Overcomer Ministr | 3965eu | | | |
| 1800-1900 vl | Ghana, Ghana BC Corp | 4915do | | | |
| 1800-1815 | Greece, Voice of | 7450eu | 9425eu | 17565sa | 17705sa |
| 1800-1900 | Guyana, GBC/Voice of | 5950do | | | |
| 1800-1900 | India, All India Radio | 7410eu | 9650af | 9950eu | 11620eu |
| | | 11935af | 13750af | 15075af | 15200af |
| 1800-1900 vl | Italy, IRRS | 3985va | | | |
| 1800-1900 | Kenya, Kenya BC Corp | 4935do | | | |
| 1800-1900 | Kuwait, Radio | 11990va | | | |
| 1800-1900 vl | Lesotho, Radio | 4800do | | | |
| 1800-1815 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 1800-1810 vl/m-f | Malawi, MBC | 5993do | | | |
| 1800-1900 | Malaysia, Radio | 7295do | | | |
| 1800-1900 | N Marianas, KFBS Saipan | 9465as | | | |
| 1800-1830 | Netherlands, Radio | 6020af | 11655af | | |
| 1800-1850 mtwhf | New Zealand, R NZ Intl | 17675va | | | |
| 1800-1900 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1800-1900 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1800-1900 | Nigeria, Radio/Lagos | 3326do | | | |
| 1800-1900 vl | Nigeria, Voice of | 7255af | 15120va | | |
| 1800-1900 | North Korea, R Pyongyang | 4405eu | 6575eu | 9335am | 11710am |
| | | 13760am | | | |
| 1800-1900 | Palau, KHBN/Voice of Hope | 9965as | | | |
| 1800-1900 vl | Papua New Guinea, NBC | 4890do | | | |
| 1800-1900 | Philippines, R Pilipinas | 11720as | 15190as | 17720as | |
| 1800-1855 | Poland, Radio Polonia | 6095eu | 7285eu | | |
| 1800-1900 | Russia,Voice of Russia WS | 5940eu | 5965eu | 9340eu | 9480eu |
| | | 9890eu | 11510af | | |
| 1800-1830 | S Africa, AWR Africa | 5960af | 6100af | | |
| 1800-1830 | S Africa, Channel Africa | 17870af | | | |
| 1800-1900 | Sierra Leone, SLBS | 3316do | | | |
| 1800-1900 vl | Solomon Islands, SIBC | 5020do | | | |
| 1800-1810 | Somalia, Radio Mogadishu | 6690af | | | |
| 1800-1900 | Sudan, Radio Omdurman | 9200va | | | |
| 1800-1830 | Swaziland, Trans World R | 3200af | 9500af | | |
| 1800-1900 | Tanzania, Radio | 5050af | | | |
| 1800-1900 | UK, BBC World Service | 3255af | 3955eu | 6190af | 6195eu |
| | | 9410eu | 9510as | 9740pa | 11980me |
| | 12095eu | 15400af | 15420af | 17830af | 17840na |
| 1800-1900 | UK, Merlin Network One | 3965eu | | | |
| 1800-1900 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1800-1900 | USA, KAIJ Dallas TX | 13815na | | | |
| 1800-1900 | USA, KJES Vado NM | 15385na | | | |
| 1800-1900 | USA, KTBN Salt Lk City UT | 15590na | | | |
| 1800-1900 | USA, KWHR Naalehu HI | 9930as | | | |
| 1800-1900 | USA, Voice of America | 6035as | 6040af | 9760as | 11920af |
| | | 11975af | 13710af | 15240af | 15580af |
| 1800-1900 | USA, WEWN Birmingham AL | 11875na | 13615na | 15745eu | |
| 1800-1900 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 1800-1900 | USA, WHRA Greenbush ME | 17650af | | | |
| 1800-1900 | USA, WHRI Noblesville IN | 9495sa | 13760na | | |
| 1800-1900 | USA, WINB Red Lion PA | 13800eu | | | |
| 1800-1900 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1800-1900 irreg | USA, WMLK Bethel PA | 9465am | | | |
| 1800-1900 | USA, WRNO New Orleans LA | 7395na | 15420va | | |
| 1800-1900 | USA, WSHB Cypress Crk SC | 15665eu | 18915af | | |
| 1800-1900 | USA, WTJC Newport NC | 9370na | | | |
| 1800-1900 | USA, WWCR Nashville TN | 9475na | 12160na | 13845na | 15685na |
| 1800-1900 | USA, WYFR Okeechobee FL | 15695eu | | | |
| 1800-1900 vl | Vanuatu, Radio | 4960do | | | |
| 1800-1827 | Vietnam, Voice of | 7145eu | 7440eu | | |
| 1800-1900 | Yemen, Rep of Yemen Radio | 11770me | | | |
| 1800-1900 | Zambia, Christian Voice | 4965do | | | |
| 1800-1900 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1800-1900 vl | Zimbabwe, Zimbabwe BC | 4828do | | | |
| 1830-1900 | Ascension Is,RTE Radio | 21630af | | | |
| 1830-1856 | Belgium,R Vlaanderen Intl | 5910eu | 9925eu | 13600eu | 17695af |
| 1830-1900 | Georgia, Georgian Radio | 11910eu | | | |
| 1830-1900 | Kiribati, Radio | 9810do | | | |
| 1830-1900 | Netherlands, Radio | 6020af | 9895af | 11655af | 13700af |
| | | 17605af | | | |
| 1830-1900 w | Philippines, FEBC R Intl | 9465eu | | | |
| 1830-1900 | Swaziland, Trans World R | 3200af | | | |
| 1830-1900 mtwhfa | Sweden, Radio | 6065eu | | | |
| 1830-1900 s | Sweden, Radio | 7345eu | | | |
| 1830-1900 as | USA, Voice of America | 9845af | 13675af | 15445af | |
| 1840-1850 | Greece, Voice of | 12105af | 15630af | | |
| 1850-1900 | New Zealand, R NZ Intl | 17675va | | | |

# Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 1900-2000 | Anguilla,Caribbean Beacon | 11775am | | | |
| 1900-2000 vl | Australia, ABC/Katherine | 2485do | | | |
| 1900-2000 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 1900-2000 | Australia, Radio | 6080as | 7240as | 9500as | 9580as |
| | | 9600as | 11880as | | |
| 1900-2000 vl | Botswana, Radio | 4820do | 4830do | | |
| 1900-2000 | Canada, CFRX Toronto | 6070do | | | |
| 1900-2000 | Canada, CFVP Calgary | 6030do | | | |
| 1900-2000 | Canada, CHNX Halifax | 6130do | | | |
| 1900-2000 | Canada, CKZN St John's | 6160do | | | |
| 1900-2000 | Canada, CKZU Vancouver | 6160do | | | |
| 1900-1956 | China, China Radio Intl | 6955af | 9440af | 9600af | 11840af |
| 1900-2000 | Costa Rica,RF Peace Intl | 15050va | | | |
| 1900-2000 | Ecuador, HCJB | 17660eu | 21455va | | |
| 1900-2000 | Eqt Guinea, Radio Africa | 15186af | | | |
| 1900-1945 | Germany, Deutsche Welle | 11765af | 11785af | 11810af | 13610af |
| | | 15135af | 15390af | 17810af | |
| 1900-2000 | Germany,Overcomer Ministr | 3965eu | | | |
| 1900-2000 s | Greece, Voice of | 7450eu | 9425eu | 17705sa | |
| 1900-2000 | Guatemala, Adv World R | 5980am | | | |
| 1900-2000 | Guyana, GBC/Voice of | 5950do | | | |
| 1900-1945 | India, All India Radio | 7410eu | 9650af | 9950eu | 11620eu |
| | | 11935af | 13750af | 15075af | 15200af |
| 1900-2000 vl | Italy, IRRS | 3985va | | | |
| 1900-2000 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 1900-2000 | Kiribati, Radio | 9810do | | | |
| 1900-2000 | Kuwait, Radio | 11990va | | | |
| 1900-2000 vl | Lesotho, Radio | 4800do | | | |
| 1900-1915 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 1900-2000 | Malaysia, Radio | 7295do | | | |
| 1900-2000 | N Marianas, KFBS Saipan | 9465as | | | |
| 1900-2000 | Netherlands, Radio | 6020af | 9895af | 11655af | 13700af |
| | | 17605af | | | |
| 1900-2000 | New Zealand, R NZ Intl | 17675va | | | |
| 1900-2000 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 1900-2000 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 1900-2000 | Nigeria, Radio/Lagos | 3326do | | | |
| 1900-2000 | Nigeria, Voice of | 7255af | 15120va | | |
| 1900-2000 | North Korea, R Pyongyang | 6520af | 9600af | 9975af | |
| 1900-1930 m-a/vl | Papua New Guinea, NBC | 4890do | 9675do | | |
| 1900-1930 | Philippines, R Pilipinas | 11720as | 15190as | 17720as | |
| 1900-2000 | Russia,Voice of Russia WS | 5920eu | 5940eu | 5965eu | 7205va |
| | 7340eu 9480eu | 9830af | 9875af | 9890eu | 11510af |
| 1900-2000 | Sierra Leone, SLBS | 3316do | | | |
| 1900-2000 vl | Solomon Islands, SIBC | 5020do | | | |
| 1900-2000 | South Korea, R Korea Intl | 5975om | 7275eu | | |
| 1900-2000 | Swaziland, Trans World R | 3200af | | | |
| 1900-1930 | Tanzania, Radio | 5050af | | | |
| 1900-2000 | Thailand, Radio | 9535eu | 9655eu | 11905eu | |
| 1900-2000 | Uganda, Radio | 4976do | | | |
| 1900-2000 | UK, BBC World Service | 3255af | 3955eu | 6005af | 6190af |
| | | 6195eu | 9410eu | 9630af | 9740pa |
| | | 11980me | 12095af | 15400af | 17830af |
| 1900-2000 | UK, Merlin Network One | 6180eu | | | |
| 1900-2000 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 1900-2000 | USA, KAIJ Dallas TX | 13815na | | | |
| 1900-2000 | USA, KTBN Salt Lk City UT | 15590na | | | |
| 1900-2000 | USA, KWHR Naalehu HI | 9930as | | | |
| 1900-2000 | USA, Voice of America | 6035af | 7415af | 9525pa | 9760af |
| | | 11870pa | 11920af | 11975af | 13710af |
| | | 15180pa | 15240af | 15580af | |
| 1900-1930 as | USA, Voice of America | 4950af | | | |
| 1900-2000 mtwhf | USA, Voice of America | 5965me | 9840as | 11720me | 11970as |
| | | 13725me | 15205me | 15410as | |
| 1900-2000 | USA, WEWN Birmingham AL | 11875na | 13615na | 15745eu | |
| 1900-2000 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 1900-2000 | USA, WHRA Greenbush ME | 17650af | | | |
| 1900-2000 | USA, WHRI Noblesville IN | 9495sa | 13760na | | |
| 1900-2000 | USA, WINB Red Lion PA | 13800eu | | | |
| 1900-2000 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 1900-2000 | USA, WRNO New Orleans LA | 7395na | 15420va | | |
| 1900-2000 | USA, WSHB Cypress Crk SC | 15665eu | 18915af | | |
| 1900-2000 | USA, WTJC Newport NC | 9370na | | | |
| 1900-2000 | USA, WWCR Nashville TN | 9475na | 12160na | 13845na | 15685na |
| 1900-2000 | USA, WYFR Okeechobee FL | 5760eu | | | |
| 1900-2000 vl | Vanuatu, Radio | 4960do | | | |
| 1900-1927 | Vietnam, Voice of | 7145eu | 9730eu | | |
| 1900-2000 | Zambia, Christian Voice | 4965do | | | |
| 1900-2000 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 1900-2000 vl | Zimbabwe, Zimbabwe BC | 4828do | | | |
| 1905-1910 | Croatia, Croatian Radio | 13830eu | | | |
| 1930-2000 | Georgia, Georgian Radio | 11760eu | | | |
| 1930-2000 | Iran, VOIRI | 7215eu | 9022eu | 9880as | |
| 1930-2000 | Serbia, Radio Yugoslavia | 6100eu | 9720eu | | |
| 1930-2000 | Slovakia, R Slovakia Intl | 5915eu | 6055eu | 7345eu | |
| 1930-2000 | Turkey, Voice of | 9630eu | 9895eu | | |
| 1935-1955 | Italy, RAI Intl | 5970eu | 7285eu | 9760eu | |
| 1956-2000 | S Africa, Voice of Hope | 6290af | | | |

## 2000 UTC

| | | | | |
|---|---|---|---|---|
| 2000-2100 | Algeria, R Algiers Intl | 11715af | 15160me | |
| 2000-2100 | Angola, Radio Nacional | 3355af | | |
| 2000-2100 | Anguilla,Caribbean Beacon | 11775am | | |
| 2000-2100 vl | Australia, ABC/Alice Spgs | 2310do | | |
| 2000-2100 vl | Australia, ABC/Katherine | 2485do | | |
| 2000-2100 vl | Australia, ABC/Tent Creek | 2325do | | |
| 2000-2100 | Australia, Radio 9500as | 9580as | 9660as | 11880as 12080as |
| 2000-2100 as | Australia, Radio | 6080as | 7240as | |
| 2000-2100 vl | Botswana, Radio | 4820do | 4830do | |
| 2000-2100 | Bulgaria, Radio | 5845eu | 7535eu | |
| 2000-2100 | Canada, CFRX Toronto | 6070do | | |
| 2000-2100 | Canada, CFVP Calgary | 6030do | | |
| 2000-2100 | Canada, CHNX Halifax | 6130do | | |
| 2000-2100 | Canada, CKZN St John's | 6160do | | |
| 2000-2100 | Canada, CKZU Vancouver | 6160do | | |
| 2000-2056 | China, China Radio Intl | 6950eu | 7170af | 9440af 9535eu |
| | | 11840af | 11975af | 11975af |
| 2000-2100 | Costa Rica,RF Peace Intl | 15050va | | |
| 2000-2100 | Ecuador, HCJB | 17660eu | 21455va | |
| 2000-2100 | Eqt Guinea, Radio Africa | 15186af | | |
| 2000-2030 | Finland, YLE/R Finland | 6135eu | | |
| 2000-2045 | Germany, Deutsche Welle | 9725eu | | |
| 2000-2100 | Germany,Overcomer Ministr | 3965eu | | |
| 2000-2100 vl | Ghana, Ghana BC Corp | 4915do | | |
| 2000-2100 | Guatemala, Adv World R | 5980am | | |
| 2000-2100 | Guyana, GBC/Voice of | 5950do | | |
| 2000-2030 | Hungary, Radio Budapest | 6025eu | 7165eu | |
| 2000-2100 | Indonesia, Voice of | 15150va | | |
| 2000-2030 | Iran, VOIRI | 7215eu | 9022eu | 9880eu |
| 2000-2100 irreg | Iraq, Radio Iraq Intl | 9685va | 11787va | |
| 2000-2030 | Israel, Kol Israel | 9435va | 11605va | 15640af 15650va |
| 2000-2100 vl | Italy, IRRS | 3985va | | |
| 2000-2100 | Kenya, Kenya BC Corp | 4885do | 4935do | |
| 2000-2100 | Kiribati, Radio | 9810do | | |
| 2000-2100 | Kuwait, Radio | 11990va | | |
| 2000-2100 vl | Lesotho, Radio | 4800do | | |
| 2000-2055 | Liberia,LCN/R Liberia Int | 5100do | | |
| 2000-2100 | Malaysia, Radio | 7295do | | |
| 2000-2100 mtwhfa | Malta, VO Mediterranean | 7440eu | | |
| 2000-2030 | Mongolia, Voice of | 9720eu | 12085eu | |
| 2000-2100 | Namibia, NBC | 3270af | 3289af | |
| 2000-2025 | Netherlands, Radio 6020af | 9895af | 11655af | 13700af 17605af |
| 2000-2100 | New Zealand, R NZ Intl | 17675va | | |
| 2000-2015 vl | Niger, Voice du Sahel | 5019do | | |
| 2000-2100 vl | Nigeria, Radio/Ibadan | 6050do | | |
| 2000-2100 vl | Nigeria, Radio/Kaduna | 4770do | | |
| 2000-2100 | Nigeria, Radio/Lagos | 3326do | | |
| 2000-2100 | Nigeria, Voice of | 7255af | 15120va | |
| 2000-2100 vl | Papua New Guinea, NBC | 9675do | | |
| 2000-2100 | Russia,Voice of Russia WS | 5940eu | 5965eu | 6205eu 7320eu |
| | | 7340eu | 9480eu | 9890eu |
| 2000-2005 | S Africa, Voice of Hope | 6290af | | |
| 2000-2100 | Sierra Leone, SLBS | 3316do | | |
| 2000-2100 vl | Solomon Islands, SIBC | 5020do | | |
| 2000-2045 | Swaziland, Trans World R | 3200af | | |
| 2000-2030 | Switzerland, Swiss R Intl | 6165eu | 9620af | 11910af 13660af |
| | | 13790af | | |
| 2000-2030 | Turkey, Voice of | 9630eu | 9895eu | |
| 2000-2100 | Uganda, Radio | 4976do | | |
| 2000-2100 | UK, BBC World Service | 3255af | 3955eu | 5975pa 6005af |
| | | 6190af | 6195eu | 9410eu 9630af |
| | 9740pa | 11835af | 12095af | 15400af 17830af |
| 2000-2100 | USA, Armed Forces Network | 4278am | 6458am | 12689am |
| 2000-2100 | USA, KAIJ Dallas TX | 13815na | | |
| 2000-2100 | USA, KTBN Salt Lk City UT | 15590na | | |
| 2000-2100 | USA, KWHR Naalehu HI | 17510as | | |
| 2000-2100 | USA, Voice of America | 4950af | 6035af | 6095as 7415af |
| | | 9760as | 11855af | 11975af 13710af |
| | | 15420af | 15580af | 17725af 17885af |
| 2000-2100 | USA, WEWN Birmingham AL | 11875na | 13615na | 15745eu |
| 2000-2100 | USA, WGTG McCaysville GA | 9400va | 12170am | |
| 2000-2100 | USA, WHRA Greenbush ME | 17650af | | |
| 2000-2100 | USA, WHRI Noblesville IN | 9495na | 13760na | |
| 2000-2100 | USA, WINB Red Lion PA | 13790eu | | |
| 2000-2100 | USA, WJCR Upton KY | 7490na | 13595na | |
| 2000-2100 | USA, WRNO New Orleans LA | 7395na | 15420va | |
| 2000-2l00 | USA, WSHB Cypress Crk SC | 11550eu | 13770eu | 15665af |
| 2000-2100 | USA, WTJC Newport NC | 9370na | | |
| 2000-2100 | USA, WWCR Nashville TN | 9475na | 12160na | 13845na 15685na |
| 2000-2100 | USA, WYFR Okeechobee FL | 5760eu | 7355eu | 15565va 21525af |
| 2000-2100 vl | Vanuatu, Radio | 4960do | | |
| 2000-2030 | Vatican City, Vatican R | 9660af | 11625af | 13765af |
| 2000-2027 | Vietnam, Voice of | 9730eu | | |
| 2000-2100 | Zambia, Christian Voice | 4965do | | |
| 2000-2100 | Zambia, Natl BC Corp | 6165do | 6265do | |
| 2000-2100 vl | Zimbabwe, Zimbabwe BC | 4828do | | |
| 2005-2100 | Syria, Radio Damascus | 12085eu | 13610eu | |
| 2015-2030 | Albania, R Tirana Intl | 7180eu | 9650eu | |
| 2015-2100 vl | Libya, Voice of Africa | 15235va | 15415va | 15435va |
| 2025-2045 | Italy, RAI Intl | 7220af | 9710af | 11880af |
| 2030-2100 th | Belarus, R Minsk | 7105eu | 7210eu | |
| 2030-2100 | Cuba, Radio Havana | 13660eu | 13715eu | 13750eu |
| 2030-2100 | Egypt, Radio Cairo | 15375af | | |
| 2030-2100 | Germany, AWR Europe | 9640af | | |
| 2030-2100 | Poland, Radio Polonia | 6035eu | 6095eu | 7285eu 9525eu |
| 2030-2100 | S Africa, AWR Africa | 9745af | | |
| 2030-2100 | Sweden, Radio | 6065eu | | |
| 2030-2045 | Thailand, Radio | 9535eu | 9655eu | 11905eu |
| 2030-2100 as | USA, Voice of America | 4950af | | |
| 2030-2100 | Uzbekistan, R Tashkent | 7105eu | 9540eu | |
| 2030-2057 | Vietnam, Voice of | 7145eu | | |
| 2045-2100 | India, All India Radio | 7150au | 7410eu | 9650eu 9910au |
| | | 9950eu | 11620va | 11715au |
| 2050-2100 | Vatican City, Vatican R | 4005eu | 5880eu | 7250eu |

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 2100-2200 | Anguilla,Caribbean Beacon | 11775am | | | |
| 2100-2130 vl | Australia, ABC/Alice Spgs | 2310do | | | |
| 2100-2130 vl | Australia, ABC/Katherine | 2485do | | | |
| 2100-2200 vl | Australia, ABC/Katherine | 5025do | | | |
| 2100-2130 vl | Australia, ABC/Tent Creek | 2325do | | | |
| 2100-2130 | Australia, Radio | 7240as | 9500as | 9580as | 9660as |
| | | 11880as | 12080as | 21740as | |
| 2100-2200 vl | Botswana, Radio | 3356do | 4820do | | |
| 2100-2200 vl | Canada, CBC N Quebec Svc | 9625do | | | |
| 2100-2200 | Canada, CFRX Toronto | 6070do | | | |
| 2100-2200 | Canada, CFVP Calgary | 6030do | | | |
| 2100-2200 | Canada, CHNX Halifax | 6130do | | | |
| 2100-2200 | Canada, CKZN St John's | 6160do | | | |
| 2100-2200 | Canada, CKZU Vancouver | 6160do | | | |
| 2100-2200 | Canada, Radio Canada Intl | 5995va | 7235va | 9770va | 9805va |
| | 11945va | 13650va | 13690va | 15325va | 17820va |
| 2100-2130 | China, China Radio Intl | 11975af | 15500af | | |
| 2100-2200 | Costa Rica,RF Peace Intl | 15050va | | | |
| 2100-2105 | Croatia, Croatian Radio | 11605af | | | |
| 2100-2130 | Cuba, Radio Havana | 13750eu | | | |
| 2100-2127 | Czech Rep, R Prague Intl | 5930na | 9430as | | |
| 2100-2200 | Ecuador, HCJB | 17660eu | 21455va | | |
| 2100-2115 | Egypt, Radio Cairo | 15375af | | | |
| 2100-2200 | Eqt Guinea, Radio Africa | 15186af | | | |
| 2100-2145 | Germany, Deutsche Welle | 9615af | 9690af | 9765as | 15135va |
| | | 15410sa | 17560va | | |
| 2100-2200 | Guyana, GBC/Voice of | 5950do | | | |
| 2100-2200 | India, All India Radio | 7150va | 7410eu | 9650eu | 9910au |
| | | 9950eu | 11620va | 11715au | |
| 2100-2200 vl | Italy, IRRS | 3985va | | | |
| 2100-2200 | Japan, Radio/NHK | 9725eu | 11850au | 17825va | |
| 2100-2130 | Kenya, Kenya BC Corp | 4885do | 4935do | | |
| 2100-2130 | Kiribati, Radio | 9810do | | | |
| 2100-2200 vl | Lesotho, Radio | 4800do | | | |
| 2100-2115 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 2100-2200 | Malaysia, Radio | 7295do | | | |
| 2100-2200 | Namibia, NBC | 3270af | 3289af | | |
| 2100-2200 | New Zealand, R NZ Intl | 17675va | | | |
| 2100-2200 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 2100-2200 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 2100-2200 | Nigeria, Radio/Lagos | 3326do | | | |
| 2100-2156 | North Korea, R Pyongyang | 4405eu | 6575eu | 9335am | 11710am |
| | | 13760am | | | |
| 2100-2200 | Palau, KHBN/Voice of Hope | 9985as | | | |
| 2100-2200 vl | Papua New Guinea, NBC | 9675do | | | |
| 2100-2125 | Poland, Radio Polonia | 6035eu | 6095eu | 7285eu | 9525eu |
| 2100-2156 | Romania, R Romania Intl | 5955eu | 7195eu | 7215eu | 9690eu |
| 2100-2200 | Russia,Voice of Russia WS | 5940eu | 5965eu | 6205eu | 7300eu |
| | | 7320eu | 7340eu | 9890eu | |
| 2100-2200 | Sierra Leone, SLBS | 3316do | | | |
| 2100-2200 vl | Solomon Islands, SIBC | 5020do | | | |
| 2100-2130 | South Korea, R Korea Intl | 6480eu | 15575eu | | |
| 2100-2200 mtwhf | Spain, R Exterior Espana | 9595af | 9680eu | | |
| 2100-2105 | Syria, Radio Damascus | 12085eu | 13610eu | | |
| 2100-2200 | UK, BBC World Service | 3255af | 3915as | 3955eu | 5965as |
| | 5975va | 6005af | 6180eu | 6190af | 6195va |
| | 9410pa | 9740pa | 11835af | 12095sa | 15400af |
| 2100-2200 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 2100-2200 | USA, KAIJ Dallas TX | 13815na | | | |
| 2100-2200 | USA, KTBN Salt Lk City UT | 15590na | | | |
| 2100-2200 | USA, KWHR Naalehu HI | 17510as | | | |
| 2100-2200 | USA, Voice of America | 6035af | 6040me | 6095as | 7415af |
| | 9595as | 9760as | 11870pa | 11975af | 13710af |
| | 15185pa 15240af | 15580af | 17725af | 17735as | 17820as |
| 2100-2200 | USA, WBCQ Monticello ME | 7415na | | | |
| 2100-2200 | USA, WEWN Birmingham AL | 9975eu | 11875na | 13615na | |
| 2100-2200 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 2100-2200 | USA, WHRA Greenbush ME | 17650af | | | |
| 2100-2200 | USA, WHRI Noblesville IN | 5745na | 9495sa | | |
| 2100-2200 | USA, WINB Red Lion PA | 13790eu | | | |
| 2100-2200 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 2100-2200 as | USA, WRMI/R Miami Intl | 9955am | | | |
| 2100-2200 | USA, WRNO New Orleans LA | 7395na | 15420va | | |
| 2100-2200 | USA, WSHB Cypress Crk SC | 11550eu | 13770eu | 15665af | |
| 2100-2200 | USA, WTJC Newport NC | 9370na | | | |
| 2100-2200 | USA, WWCR Nashville TN | 7435na | 9475na | 12160na | 13845na |
| 2100-2200 | USA, WYFR Okeechobee FL | 5760eu | 7355eu | 15565va | 21525af |
| 2100-2200 vl | Vanuatu, Radio | 4960do | | | |
| 2100-2110 | Vatican City, Vatican R | 4005eu | 5880eu | 7250eu | |
| 2100-2200 | Zambia, Christian Voice | 4965do | | | |
| 2100-2200 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 2100-2200 vl | Zimbabwe, Zimbabwe BC | 4828do | | | |
| 2110-2200 | Syria, Radio Damascus | 12085na | 13610na | | |
| 2115-2145 mtwhfa | Armenia, Voice of | 4810eu | 9965eu | | |
| 2115-2200 | Egypt, Radio Cairo | 9990eu | 15375af | | |
| 2115-2130 mtwhf | UK, BBC Caribbean Report | 5975am | 11765am | 15390am | |
| 2115-2130 as | UK, BBC World Service | 5975na | | | |
| 2130-2200 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 2130-2200 | Australia, Radio | 7240as | 9660as | 11880as | 12080as |
| | | 15415as | 17580as | 21740as | |
| 2130-2200 th | Belarus, R Minsk | 7105eu | 7210eu | | |
| 2130-2200 | Guam, AWR/KSDA | 15550as | | | |
| 2130-2200 | Iran, VOIRI | 11740as | 13720as | 13745as | |
| 2130-2155 | Moldova, R Moldova Intl | 7520eu | | | |
| 2130-2200 | South Korea, R Korea Intl | 15575eu | | | |
| 2130-2200 | Turkey, Voice of | 9525as | | | |
| 2130-2145 t f | UK BBC Calling Falklands | 11680sa | | | |
| 2145-2200 mtwhf | USA, WRMI/R Miami Intl | 7460na | | | |

### 2200 UTC

| | | | | | |
|---|---|---|---|---|---|
| 2200-2300 | Anguilla,Caribbean Beacon | 6090am | | | |
| 2200-2300 vl | Australia, ABC/Katherine | 5025do | | | |
| 2200-2300 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 2200-2300 | Australia, Radio | 9660as | 12080as | 15415as | 17580as |
| | | 17705as | 17795as | 21740as | |
| 2200-2300 | Bulgaria, Radio | 7535eu | 7545eu | | |
| 2200-2300 | Canada, CBC N Quebec Svc | 9625do | | | |
| 2200-2300 | Canada, CFRX Toronto | 6070do | | | |
| 2200-2300 | Canada, CFVP Calgary | 6030do | | | |
| 2200-2300 | Canada, CHNX Halifax | 6130do | | | |
| 2200-2300 | Canada, CKZN St John's | 6160do | | | |
| 2200-2300 | Canada, CKZU Vancouver | 6160do | | | |
| 2200-2259 | Canada, Radio Canada Intl | 5995va | 7235va | 9805va | 11705as |
| | | 13690va | 15325va | | |
| 2200-2256 | China, China Radio Intl | 7170eu | | | |
| 2200-2300 | Costa Rica,RF Peace Intl | 15050va | | | |
| 2200-2245 | Egypt, Radio Cairo | 9990eu | | | |
| 2200-2300 | Eqt Guinea, Radio Africa | 15186af | | | |
| 2200-2300 | Germany,Overcomer Ministr | 7285sa | 9485as | 9795sa | 9875sa |
| | | 11690af | | | |
| 2200-2300 vl | Ghana, Ghana BC Corp | 4915do | | | |
| 2200-2300 | Guyana, GBC/Voice of | 5950do | | | |
| 2200-2230 | Hungary, Radio Budapest | 6025eu | | | |
| 2200-2230 | India, All India Radio | 7150va | 7410eu | 9650eu | 9910au |
| | | 9950eu | 11620va | 11715au | |
| 2200-2230 | Iran, VOIRI | 11740as | 13720as | 13745as | |
| 2200-2300 | Italy, IRRS | 3985va | | | |
| 2200-2225 | Italy, RAI Intl | 6010eu | 9675as | 11900as | |
| 2200-2215 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 2200-2300 | Malaysia, Radio | 7295do | | | |
| 2200-2300 | Namibia, NBC | 3270af | 3289af | | |
| 2200-2300 | New Zealand, R NZ Intl | 17675va | | | |
| 2200-2300 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 2200-2300 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 2200-2300 | Nigeria, Radio/Lagos | 3326do | | | |
| 2200-2300 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | |
| 2200-2300 vl | Papua New Guinea, NBC | 9675do | | | |
| 2200-2230 | Serbia, Radio Yugoslavia | 6100eu | 6185eu | | |
| 2200-2300 | Sierra Leone, SLBS | 3316do | | | |
| 2200-2300 vl | Solomon Islands, SIBC | 5020do | | | |
| 2200-2230 | South Korea, R Korea Intl | 3980eu | | | |
| 2200-2300 as | Spain, R Exterior Espana | 9595af | 9680eu | | |
| 2200-2210 | Syria, Radio Damascus | 12085na | 13610na | | |
| 2200-2300 | Taiwan, Radio Taipei Intl | 5810eu | 9355eu | | |
| 2200-2300 | UK, BBC World Service | 3955eu | 5965as | 5975na | 6175na |
| | 6195va | 7110as | 9590na | 9660as | 9915eu |
| | 11835af | 11955as | 12080pa | 12095sa | 15400af |
| 2200-2300 f | UK, Merlin Network One | 6170eu | 7165eu | 9615eu | |
| 2200-2300 | Ukraine, R Ukraine Intl | 6020eu | 9560eu | 9810eu | |
| 2200-2300 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 2200-2300 | USA, KAIJ Dallas TX | 13815na | | | |
| 2200-2300 | USA, KTBN Salt Lk City UT | 15590na | | | |
| 2200-2300 | USA, KWHR Naalehu HI | 17510as | | | |
| 2200-2230 | USA, Voice of America | 7215as | 9770as | 9890as | 11760as |
| | | 15185as | 15290as | 17735pa | 17820as |
| 2200-2230 mtwhf | USA, Voice of America | 6035af | 7415af | 11975af | 12080af |
| | | 13710af | | | |
| 2200-2300 | USA, WBCQ Monticello ME | 7415na | | | |
| 2200-2300 | USA, WEWN Birmingham AL | 9385na | 9975eu | 13615na | |
| 2200-2300 | USA, WGTG McCaysville GA | 9400va | 12170am | | |
| 2200-2300 | USA, WHRA Greenbush ME | 17650af | | | |
| 2200-2300 | USA, WHRI Noblesville IN | 5745na | 9495sa | | |
| 2200-2300 | USA, WINB Red Lion PA | 13790eu | | | |
| 2200-2300 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 2200-2300 mtwhf | USA, WRMI/R Miami Intl | 7460na | | | |
| 2200-2300 a | USA, WRMI/R Miami Intl | 9955am | | | |
| 2200-2300 | USA, WRNO New Orleans LA | 7395na | 15420va | | |
| 2200-2300 | USA, WSHB Cypress Crk SC | 7510eu | 13770eu | 15285sa | |
| 2200-2300 | USA, WTJC Newport NC | 9370na | | | |
| 2200-2300 | USA, WWCR Nashville TN | 5070na | 7435na | 9475na | 13845na |
| 2200-2300 | USA, WYFR Okeechobee FL | 11740na | 15565va | 21525af | |
| 2200-2300 vl | Vanuatu, Radio | 4960do | | | |
| 2200-2210 | Zambia, Natl BC Corp | 6165do | 6265do | | |
| 2230-2300 | Albania, R Tirana Intl | 6025eu | 7160eu | | |
| 2230-2300 | Austria, R Austria Intl | 5945eu | 6155eu | 13730af | |
| 2230-2256 | Belgium,R Vlaanderen Intl | 13670na | | | |
| 2230-2300 | Cuba, Radio Havana | 9550am | | | |
| 2230-2257 | Czech Rep, R Prague Intl | 7345na | 9435af | | |
| 2230-2300 | Hungary, Radio Budapest | 3975eu | | | |
| 2230-2255 | Moldova, R Moldova Intl | 7520eu | | | |
| 2230-2300 | Sweden, Radio | 6065eu | 7325eu | | |
| 2240-2250 | Greece, Voice of | 9425au | 11645au | | |
| 2245-2300 | India, All India Radio | 7410as | 9705as | 9950as | 11620as |
| | | 13625as | | | |
| 2245-2300 | Vatican City, Vatican R | 7305au | 9600au | 11830au | |

## Frequencies

| | | | | | |
|---|---|---|---|---|---|
| 2300-0000 | Anguilla,Caribbean Beacon | 6090am | | | |
| 2300-0000 vl | Australia, ABC/Katherine | 5025do | | | |
| 2300-0000 vl | Australia, ABC/Tent Creek | 4910do | | | |
| 2300-0000 | Australia, Radio | 9660as | 12080as | 15415as | 17580as |
| | | 17705as | 17795as | 21740as | |
| 2300-0000 | Canada, CBC N Quebec Svc | 9625do | | | |
| 2300-0000 | Canada, CFRX Toronto | 6070do | | | |
| 2300-0000 | Canada, CFVP Calgary | 6030do | | | |
| 2300-0000 | Canada, CHNX Halifax | 6130do | | | |
| 2300-0000 | Canada, CKZN St John's | 6160do | | | |
| 2300-0000 | Canada, CKZU Vancouver | 6160do | | | |
| 2300-2330 | Canada, Radio Canada Intl | 5960na | 6040na | 9535am | 9755na |
| | | 11865am | | | |
| 2300-0000 | Costa Rica,RF Peace Intl | 15050va | | | |
| 2300-2330 | Cuba, Radio Havana | 9550am | | | |
| 2300-0000 | Egypt, Radio Cairo | 9900am | | | |
| 2300-2345 | Germany, Deutsche Welle | 6010as | 9815as | 13690va | |
| 2300-0000 s | Germany,Good News World R | 9405sa | | | |
| 2300-0000 vl | Ghana, Ghana BC Corp | 4915do | | | |
| 2300-0000 | Guyana, GBC/Voice of | 5950do | | | |
| 2300-0000 | India, All India Radio | 7410as | 9705as | 9950as | 11620as |
| | | 13625as | | | |
| 2300-2315 | Italy, IRRS | 3985va | | | |
| 2300-2315 | Liberia,LCN/R Liberia Int | 5100do | | | |
| 2300-0000 | Malaysia, Radio | 7295do | | | |
| 2300-2330 | Mexico, Radio Mexico Intl | 9705am | | | |
| 2300-0000 | Namibia, NBC | 3270af | 3289af | | |
| 2300-2359 | New Zealand, R NZ Intl | 17675va | | | |
| 2300-2330 vl | Nigeria, Radio/Ibadan | 6050do | | | |
| 2300-2330 vl | Nigeria, Radio/Kaduna | 4770do | | | |
| 2300-2330 | Nigeria, Radio/Lagos | 3326do | | | |
| 2300-2356 | North Korea, R Pyongyang | 11335am | 11710am | 13760am | 15130am |
| 2300-0000 | Palau, KHBN/Voice of Hope | 9955as | 9965as | 9985as | |
| 2300-0000 vl | Papua New Guinea, NBC | 9675do | | | |
| 2300-2356 | Romania, R Romania Intl | 7195eu | 9570na | 9690eu | 11940na |
| 2300-0000 | Sierra Leone, SLBS | 3316do | | | |
| 2300-0000 | Singapore,RCorp Singapore | 6150do | | | |
| 2300-0000 vl | Solomon Islands, SIBC | 5020do | | | |
| 2300-0000 | Turkey, Voice of | 5980eu | 6120eu | 6135eu | 9655va |
| 2300-0000 | UK, BBC World Service | 3915as | 5965as | 5975na | 6035as |
| | | 6175na | 6195va | 7110as | 9590na |
| | | 9915eu | 11945as | 11955as | 12095sa |
| | | 15280as | | | |
| 2300-0000 f | UK, Merlin Network One | 3985eu | 6170eu | 7165eu | |
| 2300-0000 | UK, Merlin Network One | 3975eu | | | |
| 2300-0000 | USA, Armed Forces Network | 4278am | 6458am | 12689am | |
| 2300-0000 | USA, KAIJ Dallas TX | 13815na | | | |
| 2300-0000 | USA, KTBN Salt Lk City UT | 15590na | | | |
| 2300-0000 | USA, KWHR Naalehu HI | 17510as | | | |
| 2300-0000 | USA, Voice of America | 7215as | 9770as | 9890as | 11760as |
| | | 15185as | 15290as | 17735as | 17820as |
| 2300-0000 | USA, WBCQ Monticello ME | 7415na | | | |
| 2300-0000 | USA, WEWN Birmingham AL | 9385na | 9975eu | 13615na | |
| 2300-0000 | USA, WGTG McCaysville GA | 5085va | 6890am | | |
| 2300-0000 | USA, WHRA Greenbush ME | 7580af | | | |
| 2300-0000 | USA, WHRI Noblesville IN | 5745na | 9495sa | | |
| 2300-0000 | USA, WINB Red Lion PA | 11950am | | | |
| 2300-0000 | USA, WJCR Upton KY | 7490na | 13595na | | |
| 2300-0000 a | USA, WRMI/R Miami Intl | 9955am | | | |
| 2300-0000 | USA, WRNO New Orleans LA | 7355na | | | |
| 2300-0000 | USA, WSHB Cypress Crk SC | 7510va | 13770eu | 15285sa | |
| 2300-0000 | USA, WTJC Newport NC | 9370na | | | |
| 2300-0000 | USA, WWCR Nashville TN | 3215na | 5070na | 7435na | 13845na |
| 2300-0000 | USA, WYFR Okeechobee FL | 11740na | | | |
| 2300-0000 vl | Vanuatu, Radio | 4960do | | | |
| 2300-2315 | Vatican City, Vatican R | 7305au | 9600au | 11830au | |
| 2315-0000 vl | Libya, Voice of Africa | 15235va | 15415va | 15435va | |
| 2330-0000 mtwhf | Canada, Radio Canada Intl | 5960na | 9755na | | |
| 2330-0000 as | Canada, Radio Canada Intl | 6040na | 9535am | 11865am | |
| 2330-2357 | Czech Rep, R Prague Intl | 7345na | 9435na | | |
| 2330-0000 vl | Guatemala, Radio Cultural | 3300do | | | |
| 2330-0000 | Malaysia, RTM Sarawak | 7160do | | | |
| 2330-0000 | Netherlands, Radio | 6165na | 9845na | | |
| 2330-2357 | Vietnam, Voice of | 7145as | 12020as | | |
| 2340-2350 | Greece, Voice of | 7450am | 9375am | 9420am | 12105am |

## Selected Programs

### Sundays

2300 Canada, RCI Montreal: The World This Weekend. Half-hour of up-to-the-minute news and business reports, a feature documentary, arts and entertainment stories with Michael Crabb, sports with Dzintars Cers, and a news quiz.
2300 WHR (Angel 1): USA Radio News. See S 0000.
2300 WHR (Angel 2): Standing Firm. Stan Wardlaw.
2300 WHR (Angel 5): The Call to Worship. See S 1430.
2305 WHR (Angel 1): Music. See S 0205.
2330 Canada, RCI Montreal: Madly Off in All Directions. The program that travels to all points of the country to bring listeners a wide variety of comedic talent (hosted by Lorne Elliot).
2330 WHR (Angel 5): The Rescue. Dewey Dwire.

### Monday-Friday

2300 Canada, RCI Montreal: The World at Six. CBC radio's major newscast of the day, presenting the important stories in depth and in context.
2300 WHR (Angel 1/2/5): USA Radio News. See S 0000.
2305 WHR (Angel 1): Music. See S 0205.
2305 WHR (Angel 2): For the People (repeat). Chuck Harder is back with his old talk radio show.
2330 Canada, RCI Montreal: As It Happens. Mary Lou Finlay and Barbara Budd host this daily phone-in show that introduces listeners to the newsmakers of the day and people whose stories might otherwise not be told.
2330 WHR (Angel 1/3): Lester Sumrall Teaching Series. See S 0230.

### Saturdays

2300 Canada, RCI Montreal: The World This Weekend. See S 2300.
2300 WHR (Angel 1/5): USA Radio News. See S 0000.
2303 WHR (Angel 5): Music. See S 0205.
2305 WHR (Angel 1): Music. See S 0205.
2330 Canada, RCI Montreal: The Mystery Project. A half-hour series of detective mystery dramas created by Canadian writers.
2330 WHR (Angel 1): DXing with Cumbre. See S 0000.
2330 WHR (Angel 2): Irish Sports Report. See A 0505.
2330 WHR (Angel 3): A Temple of Jesus Christ. Cleveland Waters.
2330 WHR (Angel 5): The Spoken Word of God. Alexander Scourby narrates the King James version of The New Testament.

### Hauser's Highlights

**ECUADOR: HCJB daily relays**

via Merlin UKoGBaNI sites for B-99

| kHz | UT | Site | kW | deg.az. | Lang. | Target |
|---|---|---|---|---|---|---|
| 9880 | 2100-2230 | Skelton | 250 | 175 | Arabic | NAf |
| 11760 | 1700-1830 | Rampisham | 500 | 62 | Russian | Russia |

(via Andreas Volk, via Wolfgang Büschel)

### Thank You...

### Additional contributors to this month's Shortwave Guide:

*Benelux*; *British DX Club*; *DX-Antwerp*; John Babbis, Silver Spring, MD; Larry Baysinger, KY/WJCR; Pierre Beicht, Belgium/Joe Brashier/WHRI; Dan Elysa, FL/WYFR; Bob Fraser, Cohasset, MA; Harold Frodge, Midland, MI; Glenn Hauser, Enid, OK/*World of Radio, DX Report, REVIEW OF INT'L BROADCASTERS,* Hans Johnson, AZ/ Ulis Fleming, MD /*Cumbre DX/DXing With Cumbre*; Britta Kellermeier/WRN. UK; Al Quaglieri/*NASWA Journal;* Larry Van Horn, Brasstown, NC; George Woods/*Media Scan*; Giovanni Serra/*The Four Winds*; Robert E. Thomas II, Bridgeport, CT; BBCM; *BBC On-Air; DX Ontario; Gatflash!; Hard Core DX* ; *MARE*; Radio Sweden/*Media Scan*; Usenet Newsgroups; *World Wide DX Club*.

# PROPAGATION CONDITIONS, U.S.

## OPTIMIZE YOUR MONITORING

Jacques d'Avignon
monitor@rac.ca

## How To Use This Table

The *Monitoring Times* propagation table is set up to cover three main areas of the continental US and similar circuits are calculated for each area. If you live in Canada or along the 49th parallel, and have access to the Internet, you can check the following sites for similar tables for the Canadian and northern US users at **http://www.odxa.on.ca/rac2txt99.htm**.

In the *MT* tables and on the Canadian web site, the OWF (Optimum Working Frequency) frequency for a particular circuit is displayed. This frequency should give you the best chance, 90% of the time, to hear a station located at the other end of the circuit. If you feel adventurous, look up higher than the OWF for possible signals.

The tabulated OWF is approximately equivalent to 80% of the MUF (Maximum Usable Frequency) so you could still go up in frequency in your search for a signal. For example, if the tabulated OWF is 8.0 MHz, the MUF would be 10 MHz, so you could go lurking in the upper reaches up to 10 MHz. When you reach the MUF, your chances of hearing a good signal have now decreased to about 10%. When the solar activity is high you might find some of the MUF in the 35 to 45 MHz area; you never know what you can find "up there."

The OWF can, at times, have a calculated value of "0". This value is replaced by an asterisk (*) and the cells are shaded in the *Monitoring Times* chart and on the Web pages. When you see this, do not despair; keep on looking in the vicinity of the last frequency listed for that circuit. The reason why the OWF can have a calculated value of "0" is simply that the ALF (Absorption Frequency) on this circuit, at that particular time of day, is higher than the OWF and, in theory, communication at the OWF should be impossible. But I have been in the radio field long enough to know that theory and practice do not always agree!

As it is relatively safe to assume reciprocity in the forecasts most of the time, the *MT* circuits are labeled "TO/FROM." There are some technical arguments against this assumption, but we know that the *MT* forecasts have been used with success by overseas listeners to listen to North American broadcasts.

A "P" after the name of a circuit indicates that the signal on that particular circuit can be influenced by auroral zone disturbances while traveling over the pole.

Enjoy DXing and use the propagation charts to help you locate unusual signals.

(*See this month's Utility World column for more on propagation at the peak of the solar cycle - ed*)

## OPTIMUM WORKING FREQUENCIES (MHz)

***For the Period 15 January 2000 to 14 February 2000  Flux=206  SSN=160***

***Predictions prepared using ASAPS for Windows®***

| UTC | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **TO/FROM US WEST COAST** | | | | | | | | | | | | | | | | | | | | | | | | |
| CARIBBEAN | 21 | 18 | 16 | 14 | 13 | 11 | 10 | 9 | 9 | 8 | 8 | 9 | 8 | 8 | 13 | 20 | 25 | 28 | 28 | 27 | 26 | 26 | 26 | 24 |
| SOUTH AMERICA | 19 | 18 | 19 | 18 | 15 | 13 | 11 | 11 | 11 | 10 | 10 | * | * | * | 16 | 25 | 23 | 23 | 24 | 24 | 24 | 24 | 23 | 22 |
| WESTERN EUROPE | 9 | 9 | 8 | 8 | 8 | 8 | 9 | 9 | 9 | 9 | 8 | * | * | * | 9 | 14 | 21 | 22 | 18 | 15 | 13 | 11 | 10 | 9 |
| EASTERN EUROPE (P) | 8 | 7 | 8 | 8 | 8 | 8 | 10 | 10 | 10 | 9 | 9 | 9 | 9 | 9 | 9 | 12 | 18 | 14 | 12 | 11 | * | * | * | 8 |
| NORTH AFRICA | 14 | 13 | 13 | 13 | 13 | 12 | 12 | 11 | 11 | * | * | * | * | * | 11 | 17 | 25 | 27 | 23 | 18 | 17 | 16 | 14 | 14 |
| CENTRAL AFRICA | 25 | 22 | 18 | 14 | 12 | 11 | 12 | 11 | * | * | * | * | * | * | * | 18 | 26 | 31 | 35 | 35 | 34 | 30 | 27 | 26 |
| SOUTH AFRICA | 18 | 18 | 17 | 16 | 14 | 13 | 12 | * | * | * | * | * | * | * | 15 | 23 | 23 | 21 | 21 | 22 | 23 | 24 | 22 | 19 |
| MIDDLE EAST (P) | 12 | 11 | 11 | 11 | 15 | 13 | 11 | * | * | * | * | * | * | 9 | 9 | 11 | 18 | 15 | 15 | 13 | 13 | 13 | 13 | 12 |
| CENTRAL ASIA (P) | 11 | 13 | 20 | 22 | 17 | 14 | 12 | * | * | * | 9 | 9 | 9 | 9 | 9 | 10 | 12 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| INDIA (P) | 12 | 17 | 27 | 23 | 17 | 14 | * | * | * | * | * | 8 | 8 | 8 | 8 | 9 | 12 | 14 | 13 | 13 | 13 | 12 | 11 | 10 |
| THAILAND | 24 | 31 | 28 | 25 | 19 | 15 | * | * | * | * | 9 | 9 | 9 | 9 | 8 | 9 | 11 | 18 | 17 | 15 | 14 | 12 | * | 13 |
| AUSTRALIA | 24 | 25 | 27 | 27 | 23 | 19 | 15 | 13 | 11 | 11 | 11 | 11 | 10 | 10 | 10 | 10 | 14 | 22 | 21 | 19 | 18 | 21 | 24 | 23 |
| CHINA | 21 | 30 | 28 | 25 | 19 | 14 | 12 | 10 | 9 | 9 | 9 | 9 | 8 | 8 | 8 | 9 | 11 | 11 | 11 | 11 | 11 | 11 | 12 | 12 |
| JAPAN | 31 | 28 | 25 | 22 | 18 | 14 | 11 | 9 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 10 | 9 | * | * | * | 14 | 24 | 29 |
| SOUTH PACIFIC | 23 | 22 | 22 | 22 | 19 | 15 | 14 | 11 | 10 | 10 | 10 | 9 | 8 | 8 | 8 | 10 | 13 | 16 | 21 | 22 | 22 | 22 | 23 | 21 |
| **TO/FROM US MIDWEST** | | | | | | | | | | | | | | | | | | | | | | | | |
| CARIBBEAN | 21 | 18 | 15 | 13 | 12 | 11 | 10 | 10 | 9 | 8 | 8 | 8 | 11 | 18 | 26 | 28 | 29 | 30 | 30 | 29 | 28 | 28 | 27 | 25 |
| SOUTH AMERICA | 25 | 22 | 20 | 18 | 15 | 14 | 14 | 14 | 13 | 11 | 11 | 10 | 13 | 22 | 29 | 28 | 28 | 27 | 28 | 28 | 28 | 28 | 28 | 27 |
| WESTERN EUROPE | 11 | 10 | 10 | 9 | 9 | 10 | 10 | 10 | 11 | 12 | 12 | 12 | 12 | 15 | 21 | 28 | 30 | 26 | 22 | 18 | 16 | 14 | 13 | 11 |
| EASTERN EUROPE (P) | 7 | 7 | 7 | 7 | 7 | 8 | 9 | 11 | 11 | 10 | 10 | 10 | 10 | 12 | 16 | 24 | 20 | 16 | 13 | 11 | * | * | 7 | 7 |
| NORTH AFRICA | 14 | 14 | 13 | 13 | 12 | 12 | 12 | 12 | 12 | 11 | * | * | * | 15 | 22 | 28 | 28 | 26 | 23 | 18 | 16 | 16 | 15 | 14 |
| CENTRAL AFRICA | 26 | 23 | 20 | 16 | 13 | 12 | 14 | 14 | 13 | 13 | * | * | * | 20 | 28 | 34 | 37 | 38 | 37 | 36 | 35 | 33 | 29 | 27 |
| SOUTH AFRICA | 18 | 18 | 17 | 16 | 14 | 15 | 14 | 13 | * | * | * | * | * | 21 | 23 | 23 | 23 | 21 | 21 | 21 | 22 | 23 | 22 | 19 |
| MIDDLE EAST | 12 | 12 | 12 | 12 | 13 | 14 | 13 | 13 | 12 | * | 12 | 12 | 12 | 14 | 18 | 25 | 22 | 17 | 16 | 14 | 13 | 13 | 13 | 13 |
| CENTRAL ASIA (P) | 11 | 11 | 15 | 16 | 15 | 13 | 12 | 12 | 12 | 11 | 11 | 11 | 12 | 12 | 14 | 15 | 13 | 12 | 11 | 11 | 11 | 11 | 11 | 11 |
| INDIA | 11 | 13 | 19 | 16 | 14 | 13 | * | * | * | * | * | 10 | 10 | 11 | 13 | 19 | 17 | 14 | 13 | 13 | 13 | 12 | 11 | 10 |
| THAILAND | 21 | 26 | 21 | 18 | 15 | * | * | * | * | * | 9 | 9 | 9 | 10 | 11 | 15 | 20 | 16 | 16 | 14 | 14 | 12 | 10 | 13 |
| AUSTRALIA | 24 | 25 | 26 | 22 | 18 | * | * | * | 11 | 11 | 11 | 11 | 10 | 10 | 11 | 15 | 23 | 22 | 21 | 19 | 18 | 21 | 24 | 23 |
| CHINA (P) | 17 | 25 | 21 | 17 | 15 | 13 | 11 | 11 | 10 | 10 | 10 | 10 | 10 | 10 | 11 | 13 | 12 | 12 | 11 | 11 | 12 | 12 | 12 | 12 |
| JAPAN | 30 | 26 | 23 | 19 | 16 | 13 | 11 | 10 | 10 | 10 | 9 | 9 | 9 | 9 | 10 | 10 | 10 | 10 | * | * | * | 14 | 24 | 31 |
| SOUTH PACIFIC | 25 | 24 | 24 | 20 | 17 | 14 | 12 | 11 | 11 | 11 | 10 | 9 | 9 | 9 | 12 | 15 | 15 | 18 | 24 | 24 | 24 | 25 | 25 | 24 |
| **TO/FROM US EAST COAST** | | | | | | | | | | | | | | | | | | | | | | | | |
| CARIBBEAN | 14 | 12 | 11 | 10 | 9 | 8 | 8 | 7 | 6 | 5 | 6 | 7 | 12 | 19 | 22 | 21 | 22 | 21 | 21 | 20 | 20 | 20 | 19 | 17 |
| SOUTH AMERICA | 21 | 21 | 18 | 16 | 15 | 14 | 14 | 12 | 10 | 9 | 10 | 12 | 22 | 27 | 26 | 25 | 24 | 24 | 24 | 24 | 24 | 25 | 24 | 22 |
| WESTERN EUROPE | 11 | 11 | 10 | 9 | 9 | 9 | 9 | 9 | 11 | 12 | 12 | 12 | 17 | 27 | 32 | 34 | 31 | 28 | 24 | 20 | 17 | 15 | 13 | 12 |
| EASTERN EUROPE | 8 | 8 | 7 | 7 | 8 | 8 | 9 | 12 | 11 | 11 | 11 | 11 | 14 | 24 | 28 | 26 | 22 | 18 | 14 | 12 | 10 | 9 | 8 | 8 |
| NORTH AFRICA | 14 | 14 | 13 | 12 | 12 | 11 | 12 | 12 | 12 | 12 | * | 13 | 18 | 28 | 29 | 28 | 28 | 24 | 22 | 18 | 17 | 17 | 15 | 14 |
| CENTRAL AFRICA | 22 | 19 | 17 | 15 | 13 | 12 | 13 | 12 | 12 | * | * | 15 | 23 | 31 | 35 | 35 | 36 | 35 | 32 | 31 | 30 | 30 | 27 | 25 |
| SOUTH AFRICA | 18 | 17 | 17 | 16 | 14 | 14 | 13 | * | * | * | * | 17 | 25 | 24 | 23 | 23 | 22 | 21 | 21 | 21 | 22 | 23 | 21 | 19 |
| MIDDLE EAST | 13 | 13 | 12 | 12 | 13 | 14 | 13 | 13 | 13 | 12 | 12 | 12 | 18 | 28 | 28 | 26 | 23 | 19 | 16 | 15 | 14 | 14 | 14 | 14 |
| CENTRAL ASIA (P) | 11 | 11 | 13 | 17 | 16 | 15 | 14 | 13 | 13 | 13 | 13 | 13 | 14 | 21 | 9 | 16 | 13 | 12 | 11 | 11 | 11 | 11 | 11 | 11 |
| INDIA (P) | 11 | 11 | 19 | 16 | 15 | 14 | 13 | * | * | * | 12 | 12 | 13 | 22 | 24 | 23 | 19 | 15 | 13 | 13 | 14 | 12 | 11 | 10 |
| THAILAND (P) | 16 | 21 | 19 | 17 | 15 | 14 | 13 | * | * | 12 | 12 | 12 | 12 | 17 | 25 | 24 | 20 | 16 | 15 | 15 | 14 | 12 | 10 | 11 |
| AUSTRALIA | 24 | 25 | 21 | 17 | * | * | * | * | 12 | 11 | 11 | 11 | 12 | 14 | 22 | 24 | 23 | 22 | 21 | 19 | 18 | 20 | 24 | 23 |
| CHINA(P) | 13 | 22 | 19 | 17 | 15 | 14 | 13 | 12 | 12 | 12 | 12 | 12 | 12 | 16 | 15 | 13 | 12 | * | * | * | 11 | 11 | 11 | 11 |
| JAPAN | 28 | 25 | 20 | 18 | 15 | 14 | 13 | 13 | 12 | 12 | 12 | 12 | 12 | 11 | 11 | 11 | 11 | * | * | * | 12 | 15 | 24 | 31 |
| SOUTH PACIFIC | 27 | 23 | 20 | 17 | 15 | 13 | 13 | 13 | 12 | 11 | 11 | 10 | 11 | 16 | 18 | 16 | 16 | 21 | 26 | 26 | 26 | * | * | * |

**** Unfavorable conditions: Search around the last listed frequency for activity***

***(P) denotes circuit across polar auroral zone; reception may be poor during ionospheric disturbances.***

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# Charting a Future for International Radio Broadcasting - II

To recap, as we enter a new millennium, in order to survive and begin to prosper in this new media environment, we said in this corner that the international broadcasting community needs to make five major changes. We discussed the first two in December:

*1. The international radio community must see itself as an identifiable industry with a valuable product, instead of as a set of individual competing stations and services.*

*2. With this redefined self-image, the international radio community must emphasize joint action to promote its industry and protect its assets.*

**3 International radio must raise its visibility and better articulate its value in a post cold war world.**

International broadcasters are competing in an increasingly fragmented and sophisticated media universe, but that does not mean that anyone else is providing what international radio provides. The public perception is that, even with all there is, there is still something important missing. The opportunity exists for the international radio community to show how it fills the gaps. This can only happen through joint action.

In the U.S., for example, the argument must be made that it is the international-based services that provide something truly different. **CNN**, **MSNBC**, **CNBC** and **Fox News** may provide a cacophony of voices, but all of these are American or "American-filtered" opinions. Only broadcasts originating from outside the U.S. can provide truly unique *perspectives*. In a global political and economic environment, it should be argued that having a keen understanding of these perspectives is vital and can be the difference between success and failure in one's international dealings.

**4 International radio must jointly support and develop its core assets.**

Those core assets are shortwave technology and their listeners.

Movement into new program delivery methods is certainly desirable and necessary. However, in the absence of a single dominant standard, this cannot happen at the expense of the industry's core delivery technology – especially when that technology still has demonstrated value and the potential for further technical development. Every delivery technology has its advantages and disadvantages. Shortwave technology and international broadcasting have always been synonymous and this needs to be seen as much more of a strength than it has been recently.

One of the places where international broadcasting has failed most visibly has been in its inability or unwillingness to promote its core technology. The broadcasting community should have active alliances with equipment manufacturers and vendors. If there is one commercial endeavor in which broadcasters should be involved, it is in the promotion and sale of receivers. Without its core technology, international broadcasting becomes a sort of "man without a country" – always beholden to others in the effort to be heard.

Furthermore, international broadcasters should be actively forging alliances with their listeners – DXer and program listener alike – not denigrating them as "radio freaks." Incredibly, even in an age of computer enhanced instant communications, there are no common forums for interaction between broadcasters and listeners. Developing and maintaining contacts with existing and willing listener clubs and organizations would be one way of doing this. Actively supporting worthy efforts like Ontario educator Neil Carleton's *Shortwave in the Classroom* would be another.

But there still seems to be little interest on the part of the stations to do so. Recently, a group of committed listeners (I among them) developed an e-mail list reflector called "swprograms" to pursue an on-going electronic dialogue on international radio programming. Attempts to encourage the broadcasters to join in the dialogue have been largely unsuccessful, which is most unfortunate.

In today's media environment, capturing a "mass" audience is less and less likely a proposition. Maintaining a core audience and identifying a service niche is vital for survival in an increasingly fragmented media universe. International radio broadcasters already have both. They need to build on what they have, not dismantle it in favor of something else.

**5 There must be better consultation and coordinated planning for the future.**

No one should pretend that the way ahead is easy or clear of stiff challenges. International broadcasting is public service broadcasting, under attack conceptually both domestically and internationally. Resources that do not produce immediate, tangible and pecuniary profits for investors are increasingly hard to come by. Gaining attention in a media environment with an ever increasing number of participants carries another full set of challenges.

The lack of a coordinated approach is certainly responsible, in part, for the failure of international broadcasters to gain any significant access to the decade's dominant delivery technology in the U.S. – cable television systems. This is a yawning failure. Even systems with hundreds of digital audio and video channels are devoid of any international broadcasting presence.

But there is reason for some hope. During 2000, **Radio Canada International (RCI)** will be hosting the sixth in a series of well-attended biennial international broadcasting conferences entitled appropriately *Challenges for International Broadcasting*. While it is unclear what, if any, follow-up has occurred after each conference, the fact that there is a regular dialogue is promising.

**RCI** also has apparently survived a decade-long continuous threat to its existence by securing stable funding from the Canadian government. While this good fortune is yet to be much evident in the station's on-air product, much needed technical improvements are being made to the station's Sackville transmitting facility.

**Radio Australia** is another interim success story. After losing over 50% of its annual budget and the use of two-thirds of its shortwave transmitter capacity, the station refocused its energies on the Asia-Pacific region and developed a more cooperative and synergistic relationship with its domestic counterparts, while strategically deploying shortwave and other delivery technologies for maximum effect.

With regular consultation and better coordination among international broadcasters, these successes can be more readily identified, analyzed and adapted for use by others. In addition, there is created enhanced potential for increased cooperation on such matters as joint use of assets (like transmitters), joint efforts at publicity, joint efforts with equipment manufacturers and vendors, joint efforts at regular dialogue with listeners and listener organizations, and joint movement into new delivery technologies.

## Make a Resolution

Presumably, you read this magazine because you have a passion for radio. Listening is often characterized as a passive undertaking; but, if there is to be a future for international radio, it is clear that listening will have to become a much more active exercise. Become an "active listener." Resolve to get involved – with this magazine, with a club, with the stations – and work to preserve and enhance that which we all agree is so valuable.

Until February, good listening!

# AUDIO SUBCARRIERS

By Robert Smathers, roberts@nmia.com

Audio frequencies in MHz. All satellite/transponder coordinates are C-band unless otherwise noted. DS=Discrete Stereo

| | | |
|---|---|---|
| **Classical Music** | | |
| SuperAudio–Classical Collections | G5, 21 | 6.30/6.48 (DS) |
| WCPE-FM (89.7) | | |
| Raleigh/Durham/Chapel Hill, NC | G5, 7 | 5.58/6.12 (DS) |
| WFMT-FM (98.7) Chicago, IL–Fine Arts | G5, 7 | 6.30/6.48 (DS) |
| WQXR-FM (96.3) New York, NY | S4, 14 | 6.20/6.80 (DS) |
| **Satellite Computer Services** | | |
| Superguide | G5, 7 | 5.48 |
| **Contemporary Music** | | |
| SuperAudio–*Light and Lively Rock* | G5, 21 | 5.96, 6.12 (DS) |
| WPHZ-FM (96.9) | | |
| Bremen, IN (South Bend market) | G6, 15 | 6.48, 7.30 (DS) |
| **Country Music** | | |
| SuperAudio–*American Country Favorites* | G5, 21 | 5.04/7.74 (DS) |
| WSM-AM (650) Nashville, TN | C4, 24 | 7.38/7.56 (DS) |
| **Easy Listening Music** | | |
| FCC mandated safe-harbor program audio-easy listening music | | |
| | G3R, 9 | 6.80 |
| | G5, 2 | 6.80 |
| SuperAudio–*Soft Sounds* | G5, 21 | 5.58/5.76 (DS) |
| United Video–easy listening music | C4, 8 | 5.895 (N) |
| **Foreign Language Programming** | | |
| Antenna Radio (Greek) | S4, 14 | 7.80 |
| La Cadena CNN Radio Noticias | | |
| (CNN Radio News in Spanish) | G5, 17 | 7.56 |
| Radio Portugal (RDP) Antena 1 | E1, 10 | 7.28 |
| Radio Sedaye Iran | GE3, 15 | 6.16 |
| Radio Tropical | G7, 12 | 7.60 |
| SRC AM Network | E2, 1 | 7.38 |
| SRC FM Network | E2, 1 | 5.41/5.58 (DS) |
| **Jazz Music** | | |
| KLON-FM (88.1) | | |
| Long Beach, CA., ID-*Jazz-88* | G5, 2 | 5.58/5.76 (DS) |
| Superaudio–*New Age of Jazz* | G5, 21 | 7.38/7.56 (DS) |
| **News and Information Programming** | | |
| Broadcast News | E2, 1 | 5.78 |
| Cable Radio Network | G5, 2 | 8.30 |
| | G7,6 | 7.30 |
| | C1, 21 | 7.30 |
| CNN Headline News | G5, 22 | 7.58 |
| CNN Radio News | G5, 5 | 7.58 |
| | G5,5 | 6.30 |
| | G5, 22 | 6.30 |
| USA Radio Network– | | |
| news, talk and information | GE3, 13 | 5.01 , 5.20 |
| WCBS-AM (880) New York, NY–news | T4, 11 | 7.38 |
| **Religious Programming** | | |
| Ambassasor Inspirational Radio | GE3, 15 | 5.96, 6.48 |
| Brother Staire Radio | G5, 6 | 6.48 |
| KHCB-FM (105.7) Houston, TX | GE1,9 | 7.28 |
| KMUS-AM (1380) Muskogee, OK | G1R, 24 | 5.80 |
| LDS Radio Network | C1, 6 | 5.58 |
| Radio 74 International | G3R, 23 | 5.58 |
| Salem Radio Network | GE3, 17 | 5.01, 5.20 |
| Trinity Broadcasting radio service | G5, 3 | 5.58/5.78 (DS) |
| WROL-AM (950) Boston, MA | GE3, 3 | 6.20 |
| **Rock Music** | | |
| SuperAudio–*Classic Hits*-oldies | G5, 21 | 8.10/8.30 (DS) |
| SuperAudio–*Prime Demo*-mellow rock | G5, 21 | 5.22/5.40 (DS) |
| **Shortwave Broadcasters via Satellite** | | |
| C-SPAN Audio 1: | | |
| Various shortwave broadcasters | C3, 7 | 5.20 |
| C-SPAN Audio 2: | | |
| British Broadcasting Corporation (BBC) | C3, 7 | 5.41 |
| Deutsche Welle | GE1, 22 | 7.38, 7.56, 7.74, 7.92 |
| RAI Satelradio Italy (Italian) | G7, 14 | 7.38 |
| WEWN–Worldwide Catholic Radio, | | |
| Vandiver, AL | G1R, 11 | 5.40, 7.20, 7.38 (English), 5.58 (Spanish) |
| WHRA Africa/Middle East– | | |
| World Harvest Radio, South Bend, IN | G6, 15 | 7.82 |
| WHRI Americas– | | |
| World Harvest Radio, South Bend, IN | G6, 15 | 7.46 |
| WHRI Europe – | | |
| World Harvest Radio, South Bend, IN | G6, 15 | 7.55 |
| KWHR Asia– | | |
| World Harvest Radio, South Bend, IN | G6, 15 | 7.64 |
| KWHR South Pacific– | | |
| World Harvest Radio, South Bend, IN | G6, 15 | 7.73 |
| World Radio Network: WRN1 North America | G5, 6 | 6.80 |
| World Radio Network: WRN2 North America | G5, 6 | 6.20 (Multi-lingual) |
| **Speciality Formats** | | |
| Aries In Touch Reading Service | C4,10 | 7.87 |
| Colorado Talking Book Network | C1,3 | 5.60 |
| SuperAudio–Big Bands (Sun 0200-0600 UTC) | G5, 21 | 5.58/5.76 (DS) |
| Weather Channel–background music | C3, 13 | 7.78 |
| Wisdom Radio Network | GE1, 12 | 7.10 |
| | GE1, 12 | 7.92 |
| Yesterday USA–nostalgia radio | G5, 7 | 6.80 |
| **Talk Programming** | | |
| American Freedom radio network | S4, 19 | 5.80 |
| Amerinet Broadcasting | G1R, 17 | 5.58 |
| Business Radio Network | C4, 10 | 8.06 |
| Eagle Forum Radio Network | G9, 2 | 5.80 |
| For the People radio network | C1, 6 | 7.50 |
| Republic Radio International | G7, 14 | 7.70 |
| Talk America Radio Network #1– | | |
| talk programs | GE3, 9 | 6.80 |
| Talk America Radio Network #2– | | |
| talk programs | GE3, 9 | 5.41 |
| Talk Radio Network (TRN) | C1, 14 | 5.80 |
| Truth Radio Network | G9,2 | 5.40 |
| TVRO.NET (featuring Keith Lamonica) | S4, 16 | 5.80 |
| United Broadcasting Network | C1, 2 | 7.50 |
| WWTN-FM (99.7) Manchester, TN– | | |
| news and talk | G5, 18 | 7.38, 7.56 |
| **Variety Programming** | | |
| CBM-FM (88.5) Montreal,PQ Canada– | | |
| variety/fine arts | E2, 1 | 6.12 |
| WNMX-FM (106.1) "Mix 106" Waxhaw, NC | G1R, 17 | 7.927 |
| WUSF-FM (89.7) Tampa- | | |
| St.Petersburg, FL (Public Radio) | C4, 10 | 8.26 |

# FM SQUARED (FM²) AUDIO GUIDE

NOTE: FM Squared service to religious broadcasters on GE-3 will cease on March 1, 2000 as the transition to digital audio delivery is completed.

### GE-3 Transponder 13 (C-band)

| | |
|---|---|
| Ambassador Inspirational Radio | 4.47 and 4.65 MHz |
| Blank audio carriers | 1.05 and 3.57 MHz |
| Focus on the Family | 1.23 and 1.41 MHz |
| Information Radio Network | 3.39 MHz |
| International Broadcasting Network (IBN) | 4.83 MHz |
| USA Radio Network | 4.30, 5.01 and 5.20 MHz |
| Various Religious Programs (no common ministry) | .33 and 3.75 MHz |
| VCY/America (channel 1) | .51 MHz |
| VCY/America (channel 2) | .78 MHz |

### GE-3 Transponder 17 (C-band)

| | |
|---|---|
| Blank audio carriers | 3.57 MHz |
| Data Transmission | .80, 1.14, 1.21, and 2.06 MHz |
| Focus on the Family | 1.05 and 1.40 MHz |
| In-Touch Ministries | 4.47 MHz |
| Salem Satellite Network | 4.65, 4.84, 5.01, and 5.20 MHz |
| SRN News | .33 MHz |
| USA Radio Network | 1.77 MHz |

### Galaxy 3R Transponder 3 (Ku-band)

| | |
|---|---|
| Blank Audio Carriers | 2.06, and 3.14 MHz |
| Data transmissions | .06, .62, 2.93, 3.07 and 3.17 MHz |
| AP Network News | 3.53 MHz |
| In-Store audio network ads (various companies) | .62, .71, .81, .88, 1.05, 1.15, 1.26, 3.25, 3.44, 3.62, 3.70, 3.80, 3.88, 3.97 and 4.20 MHz |
| Muzak Services | .15, .27, .39, .51, .98, 1.36, 1.48, 1.60, 1.72, 1.84, 1.96, 2.19, 2.31, 2.44, 2.56, 2.68, 2.80, 3.34, 4.08, 4.34, and 4.45 MHz |

### Galaxy 3R Transponder 16 (Ku-band)

| | |
|---|---|
| Data transmissions | .06, .64, 1.95, 2.18, 2.40, 2.52, 2.73, 2.82, 2.92, 3.20, 3.38, 3.47, 3.73, 3.97, 4.14, and 4.24 MHz |
| In-Store audio networks | .15, .27, .39, .99, 1.11, 1.59, 1.71, and 1.83 MHz |

### Telstar 5 Transponder 28 (Ku-band)

| | |
|---|---|
| Data Transmissions | .06, .15, .23, .30, .35, .38 .47, .57, .65, .71, .74, .76, .84, .89, .93, .96, 1.05, 1.12, 1.22, 1.35 MHz |

# SATELLITE LOADING REPORT OF THE MONTH

### Telstar 7 at 129 degrees West longitude

**C-band**

| | |
|---|---|
| 1 | |
| 2 | Pay-per-view [digital] |
| 3 | Pay-per-view [digital] |
| 4 | Pay-per-view [digital] |
| 5 | Pay-per-view [digital] |
| 6 | |
| 7 | |
| 8 | |
| 9 | |
| 10 | Telstar 7 ID Slate |
| 11 | |
| 12 | Time Warner Digital Cable [proprietary digital] |
| 13 | |
| 14 | Time Warner Digital Cable [proprietary digital] |
| 15 | |
| 16 | |
| 17 | |
| 18 | Time Warner Digital Cable [proprietary digital] |
| 19 | |
| 20 | Time Warner Digital Cable [proprietary digital] |
| 21 | |
| 22 | |
| 23 | Time Warner Digital Cable [proprietary digital] |
| 24 | |

**Ku-band**

| Tr | Freq | Pol | Service |
|---|---|---|---|
| 1 | 11720 | V | |
| 2 | 11740 | H | |
| 3 | 11760 | V | |
| 4 | 11780 | H | |
| 5 | 11800 | V | |
| 6 | 11820 | H | |
| 7 | 11840 | V | IBM Learning Services |
| 8 | 11860 | H | IBM Learning Services |
| 9 | 11880 | V | Occasional Video |
| 10 | 11900 | H | Occasional Video |
| 11 | 11920 | V | Occasional Video |
| 12 | 11940 | H | |
| 13 | 11960 | V | Telstar 7 ID Slate |
| 14 | 11980 | H | |
| 15 | 12000 | V | |
| 16 | 12020 | H | |
| 17 | 12040 | V | |
| 18 | 12060 | H | Data Transmissions |
| 19 | 12080 | V | Data Transmissions |
| 20 | 12100 | H | |
| 21 | 12120 | V | Data Transmissions |
| 22 | 12140 | H | |
| 23 | 12160 | V | Data Transmissions |
| 24 | 12180 | H | |

## Coming Next Month:

Single Channel Per Carrier Services (SCPC) and Loading Report. This month we started with a new satellite, Telstar 7, but next month we'll go to SBS-6 and work our way west.

Ken Reitz, KS4ZR
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# Four Best Kept Secrets of Satellite TV

The satellite TV industry is over 20 years old, yet, despite the speed-of-light information age in which we live, some aspects of this industry just don't get a lot of press. That's why I'm about to let you in on what I consider to be the four best kept secrets in the business. These sources combined will lead you to nearly everything you need to know about satellite TV: what's on all the satellites; where to go for latest satellite news, where to go for reliable repairs; and where to go for inexpensive, hard-to-find equipment.

All of these businesses have on-line components. If you don't have a computer you can still have access to the web. Most public libraries provide public access computers for on-line use. You can check in daily, weekly or as often as you can and stay abreast of the industry without actually owning a computer.

## Lyngemark Satellite Charts

There are about 170 broadcast satellites orbiting the Earth some 23,000 miles out from the equator. Each of these has between 10 and 50 transponders, all capable, in turn, of carrying between 1 and 10 channels of video depending on whether it's analog or digital in format. That gives us more than 10,000 video and audio services to try to keep up with. With satellites being launched nearly every week and programmers coming and going like ships in a harbor, it would be nice to have a place to go for accurate and up-to-date information. Well, there is: **www.lyngsat.com**.

Christian Lyngemark, founder and operator of lyngsat.com, has developed this site into the premier, worldwide, satellite television information center. Through clever web design, use of color-coding and careful attention to detail, it's possible to find out what's on each transponder of each satellite currently in geostationary orbit. Hard-to-find details such as digital parameters of DVB channels, listings of all audio subcarrier services, and frequencies of each transponder are displayed in a very easy-to-read and understandable format.


Want to find the azimuth and elevation of any given satellite relative to your own location? Simply click on the SatTracker icon in the upper left hand corner of the chart and you'll be taken directly to a page where you can determine just how to point your dish for any particular satellite.

All of these charts are updated daily with the help of an army of worldwide satellite TV enthusiasts. When new information on any given channel is added, the date of the addition and the name of the person contributing the information is given. You may recognize the names of some of the contributors!

Make it a practice first thing in the morning to log onto lynsat.com and check out the Lyngemark Satellite Chart for North and South America. Here each satellite is listed by location in degrees longitude (there are 43 satellites in the current chart). By quickly scanning the last column, which has the date of latest update, you can immediately see if there is anything new since the last time you checked in. Since the dates are color-coded and the latest dates are in dark blue, a mere glance tells you which satellites have had changes. Clicking on the satellite listed brings up that chart.

Let's take a look at the chart for Telstar 5 at 97°W. If you were to turn your dish to this satellite and click through the analog transponders, you'd see there were a couple of in-the-clear channels and a number of Leitch encrypted Network related channels. The Ku-band side of T5 would be even less impressive. But, checking out the details on lyngsat.com you'll see there are 100 analog and digital channels on the satellite.

There are 24 pay-per-view movie channels in the DigiCipherII format, dozens of encrypted MPEGII channels; two unencrypted channels for home schooling folks; a package of encrypted MPEGII channels aimed at the Filipino audience (decoders for which are available below); a package of unencrypted MPEGII channels aimed at the Japanese audience; a package of encrypted MPEGII programs aimed at the Chinese audience (decoders for which are also available below); a package of unencrypted MPEGII programs aimed at the Arab speaking community; and various other channels including the Maharishi Open University and Bloomberg TV.

Without access to lyngsat.com you wouldn't have a clue as to what was on this satellite. Incidentally, we can also see on this chart that there are two channels of Chinese music and three of Arabic radio programming, all for the listening if you know how to look.

There is one other aspect to lyngsat.com which you need to know about. A complete updated list of recent, current and future satellite launches is also found here. You'll learn which satellite is going up, when, and on which launch vehicle, where it's going, what it's going to replace, and on what satellite and transponder you'll actually be able to watch the launch!

## SBCA e-Newsletter

The Satellite Broadcasting and Communications Association is one of the oldest industry trade groups in the satellite industry. Tracing its beginnings back to the late '70s to the original organization known as SPACE, the SBCA has evolved into a lobbying group which directs its efforts into steering Congress into crafting legislation favorable to the satellite industry. This has been a formidable task in the last twelve months as an all-out war between the NAB (National Association of Broadcasters) and the Cable-TV industry was fought over legislation intended to level the television delivery playing field.

The SBCA has also worked closely in trying to help the FCC in its efforts to write rules governing the use of home satellite TV dishes. The SBCA has often filed briefs in support of consumers who were threatened with legal action by municipal steam-rollers attempting to usurp their rights to receive satellite delivered programming.

The SBCA maintains an excellent web site (**www.skyreport.com**) which is home to a large amount of industry related data and news. However, it's their newsletter called *SkyREPORT.com* E-News which can be de-

livered daily to your E-mail address that you'll find most useful. Here you'll get typically five or six short news items pertinent to the satellite TV industry. You'll find out what legislation is pending; which birds are ready for launch; behind the scenes industry wheeling and dealing; solid information and occasional rumor mongering. Links to web sites involved in the articles are often provided. You never know where *SkyREPORT* will take you! It's timely, well written, and indispensable for anyone with an interest in this industry.

## Professional Satellite Repair

OK, you just got back from the hamfest with your $50 Houston Tracker satellite receiver. After plugging it in and hooking it up to your dish, you find it's not quite as great as the guy who sold it to you said it was. What to do? ... Your receiver just cratered and your local dealer says he's no longer dealing in C-band equipment. Now what? ... Your old Uniden receiver has just conked out after 5 years of faithful service. Your local dealer is out of business and no one else can help. What now? ... Luckily, the answer to all these problems is: call Brian Hoopsick at Professional Satellite Repair.

PSR has been repairing C-band satellite equipment for years. They have a dedicated team of factory-trained repair technicians who can restore virtually any receiver to working condition. The best part is that they'll do so at a reasonable cost and in quick fashion. You thought service like this disappeared along with home milk deliveries? Not so. In fact, Brian Hoopsick says, "We have 24 hour turn around. If we receive an item to be repaired Monday, we'll ship it back by Tuesday with a 6 month warranty on parts and labor on the whole receiver!"

I recently tried them out, sending in an old General Instrument 1000 receiver which had unstable video. For $62 including parts, labor, shipping and C.O.D. charge I had the receiver back and in operation as good as new the next week. Forget local dealers whining about not being able to make any money in this business or jack leg repair personnel who can't seem to do the job! Call PSR and get years more viewing pleasure from your C-band gear.

But wait, you say you have an old RCA DSS receiver which died just after the warranty expired? No problem, PSR repairs all DSS receivers as well, just give 'em a call and they'll give you the details. With tens of thousands of satellite receiver repairs under their belt the folks at PSR have literally written the book on the subject. Hoopsick's "*Insider's Notebook*" was a big seller to satellite repair technicians all over the U.S. You can call PSR toll free at 877-PSR-FIX2 or visit their web site at **www.psr1.com**.


## Big Business at smallear.com

So many readers have asked me where they can find good, cheap, new receivers and hard to find small dishes. There's only one place left that specializes in this kind of equipment: **www.smallear.com**. At this web site you'll find an impressive list of basic, low cost analog and MPEGII receivers as well as UPS shippable 4.5-ft. dishes, and other related items.

And, you'll find them at cheaper prices than anywhere else. This is the satellite experimenters' shopping mall. They have complete C-band MPEGII systems for under $400 including dish, cable, LNBF and MPEGII receiver. It's amazing. Complete stand-alone Ku-band systems are here too at incredible prices.

Also found at smallear.com are answers to a lot of your questions regarding C and Ku-band reception, Russian-American, Korean, Vietnamese, Arabic, Chinese, and Filipino programming. They sell the decoders needed to receive the encrypted ethnic programming found on many North American satellites. They also provide access to screen shots from all manner of satellite programs, satellite charts, and tips from many users writing in to tell of their own experiences with small and big dish satellite TV.


You can contact smallear.com on-line or via phone: Tech Help Line (877) 463-3212, Tech Help FAX (888) 731-1834. To place an order call (877) 463-3212 or FAX your order at (888) 731-1834.

# VIEW FROM ABOVE

**WATCHING THE WEATHER SATELLITES**

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# Seasonal Changes

The effects of the rapid approach of winter suddenly hit me while listening to NOAA-14's afternoon pass on a day in November. For many months we hear it transmit visible light imagery throughout the north-bound pass. An experienced ear can tell from the sound whether visible-light or near-infrared images are being transmitted: the visible-light image content adds a lower pitch than the infrared to the half-second-period signal, so we usually hear a "tick, tock" repeating sound.

When the satellite reaches the darker polar region the visible-light component is replaced by the near-infrared image – and the sound changes quite distinctly to a "tick, tick." For those decoding the image, this naturally coincides with the screen display changing from visible-infrared to two infrared images of slightly different spectral components.

Another effect of the rapidly dropping levels of sunlight in northern latitudes is the switching off (or on) of Meteor 3-5. This Russian weather satellite (WXSAT) is not in a sun-synchronous orbit, so the plane of its orbit slowly drifts. The WXSAT's automatic picture transmission (APT) was switched off during October when the orbital plane approached the morning terminator.

By the second half of December or possibly earlier it will have passed through the "twilight zone," so we may hear it operating once more. It will be passing southbound, but having come over the dark north pole, it will be "off." After a few minutes, the satellite enters sunshine and should switch on while at a good elevation; we can then expect a fair signal strength, with little of the fading experienced at lower elevations.

Resurs-01 N4 has provided regular APT from sun-synchronous orbit, though there has been some indication of a deterioration in image quality. I often find such changes are temporary and good quality images are the norm.

The Russian resources satellite Okean-O has provided fairly regular bursts of short-lived telemetry while over western Europe, so several WXSAT monitors have obtained images of various types – radar, microwave and even visible-light!

## More DMSP images released

Images obtained by Defense Meteorological Satellite Program (DMSP) satellites are being made available on the Internet in increasing numbers. Paul J. McCrone is the Chief Forecaster at HQ Air Force Weather Agency (AFWA), and he kindly e-mailed me the addresses of two new sites which I found providing images of stormy weather systems. Site addresses are given below. The images are made available by Dr. Ken Dewey of the High Plains Climate Center (HPCC) at the University of Nebraska.

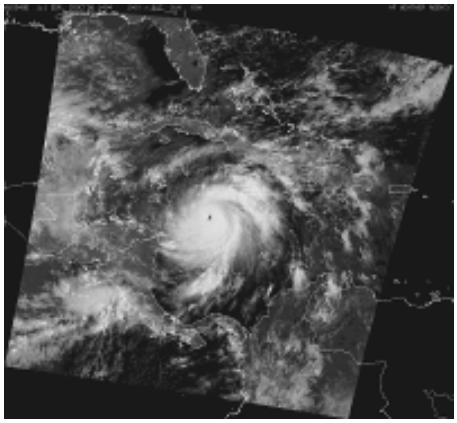

**FIG 1:** ***Hurricane Mitch from DMSP-14 on October 25, 1998 at 1404 UTC – courtesy Air Force Weather Agency, Meteorological Satellite Applications branch.***

Figure 1 is a multi-spectral image from the DMSP-14 satellite, combining visible and infrared spectral components. The web site provides samples of imagery from other spectral sensors.

The Defense Meteorological Satellite Program (DMSP) is a Department of Defense project run by the Air Force Space and Missile Systems Center (SMC). The program designs, builds, launches, and maintains several near-polar orbiting, sun synchronous satellites monitoring the meteorological, oceanographic, and solar-terrestrial environments at an altitude of approximately 830 km above the earth. Each satellite provides a footprint over any point on the earth several times each day. Having an orbital period of about 101 minutes, they provide nearly complete global coverage of clouds every six hours.

Each of the satellites monitors the solar and geophysical environments of the Earth, using visible and infrared sensors to collect images of global cloud distribution across a wide swath during day and night. The coverage of the microwave imager and sounders are one-half the visible and infrared sensors coverage, so they cover the polar regions above 60 on a twice daily basis but the equatorial region on a daily basis. The space environmental sensors record along-track data. Their electron precipitation sensors provide data that updates auroral measurements available in near-real-time on the web:
**http://solar.uleth.ca/www/aurora.html**
DMSP image sites:
**http://members.aol.com/_ht_a/PaulJMC/html/storm.html**
**http://hpccsun.unl.edu/satellite/.**
**http://www.ngdc.noaa.gov/dmsp/dmsp.html**

## FengYun-2 geostationary WXSAT "fixed"

Reports of the apparent demise of the Chinese geostationary WXSAT FengYun-2 were premature! At the end of October, China's National Satellite Meteorological Center (NSMC) released the latest images received from the satellite, now working once more. It is interesting to note that the Chinese site carries the most up-to-date images, but the NASA ftp site listed below for Goddard Space Flight Center carries the better quality.

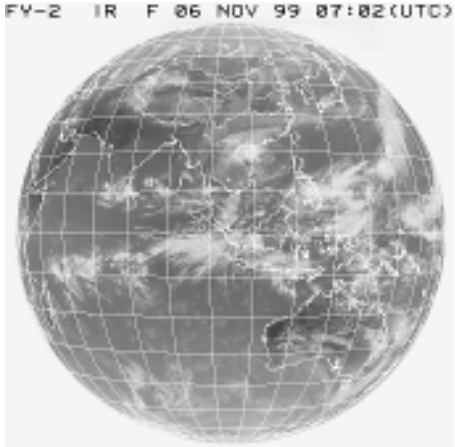


**FIG 2:** ***FY-2 infrared image November 6, 1999 at 0702 UTC***

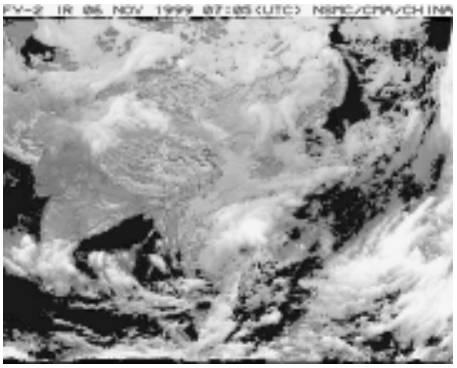


**FIG 3:** *FY-2 infrared image November 6, 1999 at 0705 UTC showing mainland China*

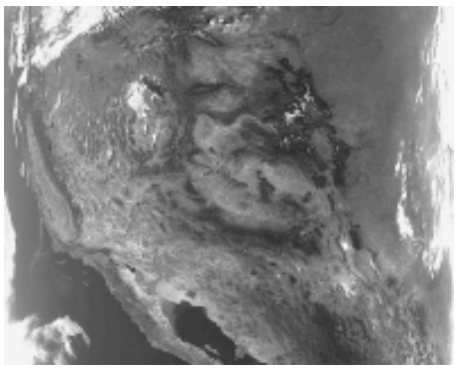

**FIG 4:** *FY-1C image from October 9, 1999*

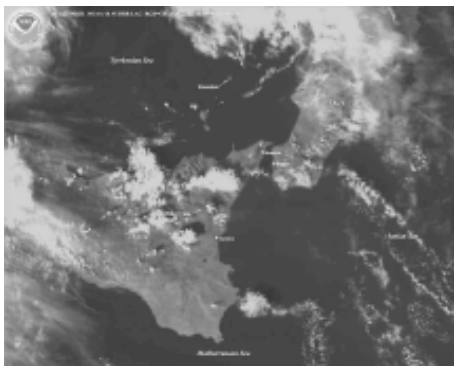

**FIG 5:** *NOAA-14 November 4, 1999 courtesy OSEI team.*

Pictures are courtesy of National Satellite Meteorological Center of CMA. Figure 3 is a simulated 3-D plot on a close-up view of China from FengYun-2.

The Chinese polar WXSAT FengYun-1C provides high resolution image transmissions, and Edward A Murashie kindly provided me with a selection.

FengYun-1C carries a radiometer providing 10 sensor channels (four visible-light, three near-infrared, one shortwave infrared channel and two long-wave infrared channels) – discrete spectral bands optimized for daytime cloud, ice and snow, vegetation, heat from night clouds, soil humidity, ocean color and water vapor. Having a ground resolution of 1.1 km, the satellite is capable of providing some excellent imagery – as shown by Ed Murashie's image of the northwestern continent – see figure 4.

Site addresses:

Chinese Meteorological Agency - **http://www.cma.gov.cn/**

Direct address for FY-2 images - **http://202.106.103.181/fy2.htm**

NASA ftp site carrying high quality FY-2 images:

**ftp://rsd.gsfc.nasa.gov/pub/Weather/FY-2/jpg/ir2/4km/**

For general information on China's space program visit the "Go Taikonauts" site at:

**http://www.geocities.com/CapeCanaveral/Launchpad/1921/**

## Software updates - WXSAT and WXTRACK

During recent months, three major WXSAT programs have been upgraded. *Christian Bock* has released version 2.5 revision 7 of *WXSAT*, and *David Taylor* has continued to upgrade both *WXTRACK* and *SatSignal*, though newer versions need registering for full operation. The new version of *WXSAT* has been considerably improved and no longer terminates when the computer's processor chip becomes "overloaded."

For those unfamiliar with the nature of this software, it relies on the use of a sound-card. Demodulated APT from a WXSAT receiver is fed to the sound-card and the program is configured to analyze this signal. There is a "test" option that validates the incoming WXSAT signal; when the Windows-95/98 operating system has the sound recorder operating correctly and the sound-card inputs correctly adjusted (via volume control), a demodulated APT waveform should be seen on-screen. This can then be either recorded (using the live recording option on the main menu) or the resultant wav file recorded. This latter option allows reliable recording during operator absence, and results in a set of wav files being stored on the hard drive. It is these files that can be subsequently processed by either *WXSAT* itself, or by David's *SatSignal* program.

*WXSAT* comes with a comprehensive help facility that provides much information about the format of WXSAT signals – both polar and geostationary. You can leave it operating in your absence and – who knows – you might even catch a rare transmissions from Okean or Sich!

*SatSignal* is a very effective wav file (recorded APT-signal) processing program that extracts detail to the limit of the satellite's own capabilities. In fact, in one way it appears to go beyond them! The program samples the wav file at a high (and adjustable) rate, depending on the original sound-recording sampling rate, and can resample the image vertically to interpolate. With auto-black level, gamma correction and sharpening facilities, the result is often very good – limited only by the received signal quality from your antenna and receiver.

David's other program, *WXTRACK*, was upgraded in late October, and the new version adds some new facilities. Take the trouble to download the large ground topography database – links are provided on David's page. The file unzips to 18 Mb and enhances the ground track presentation.

**http://www.rig.org.uk/**
**http://www.davidtaylor.freeserve.co.uk/software/wxsat.htm**

## OSEI team monitor volcano on Sicily

One of my favorite Internet WXSAT image sites is that of the Operational Significant Event Image (OSEI) team that monitor significant weather events using the weather satellites. In western Europe, the volcano on Mount Etna was erupting again during early November. Some evidence of this has just about been detectable in APT, but the NOAA WXSATs have been recording high resolution images – see figure 5. Careful examination of the image shows the heat signature as red, and the ash as a blue haze near Etna. To the north, a hot spot is also visible at the Stromboli volcano.

For more selections visit:

**http://www.osei.noaa.gov/**

### FREQUENCIES

NOAA-14 transmits APT on 137.62 MHz
NOAA-15 transmits APT on 137.50 MHz
NOAAs transmit beacon data on 137.77 or 136.77 MHz
Meteor 3-5 (off during November) may transmit APT on 137.30 MHz when in sunlight
Resurs 1-4 transmits APT on 137.85 MHz
Okean-O, Okean-4 and Sich-1 sometimes transmit APT briefly on 137.40 MHz
GOES-8 and GOES-10 use 1691 MHz for WEFAX

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# Campaign 2000

We are now well into the political campaign season and it is time to follow the candidates for national office as they travel around the country. You can keep track of their comings and goings by listening to selected frequencies in the federal bands on your scanner.

The candidates for President and Vice President are afforded Secret Service protection. Table 1 lists all the known Secret Service protection frequencies nationwide. In addition to the frequencies in Table 1, be sure to program your state, county and local police frequencies, as they will provide a support role in any protection operation.

Another useful set of frequencies to program in your scanner for campaign operations is the itinerant business frequencies such as 154.570, 154.600, etc. These frequencies might have the candidate's staff communicating about getting him or her to their next campaign stop.

Finally, for high ranking House and Senate members, watch the following frequencies very closely. Representatives and Senators sometimes travel with Capitol Police protection and these frequencies could be very active during Campaign 2000. The frequencies to watch include: 163.100, 168.350, and 170.175.

Other interesting federal frequencies to keep in your scanner include: 408.400, 418.050, 418.075, and 418.575.

Also this month we continue our exploration of the VHF high government frequency band, started in the December 1998 issue of the *Fed Files*, by profiling the 168.0-168.9875 MHz range in Table 2.

Courtesy of Secret Service

So load up those scanners and let us know what you are hearing in the federal bands. Until next month, good hunting.

## TABLE 1: NATIONWIDE FEDERAL PROTECTION FREQUENCIES

**US Secret Service/White House Communications Agency (WHCA)**

| | |
|---|---|
| 32.230 | Alpha (WHCA assignment has not been reported recently) |
| 165.7875 | Baker (Secret Service/WHCA) |
| 165.3750 | Charlie (Secret Service/WHCA) |
| 169.9250 | Delta (WHCA) |
| 407.8500 | Echo (WHCA Echo/Foxtrot system no longer operational nationwide) |
| 415.7000 | Foxtrot (WHCA Echo/Foxtrot system no longer operational nationwide) |
| 166.4000 | Golf (Secret Service) |
| 167.9000 | Hotel (WHCA DC area only) |
| 407.9250 | India (Secret Service) |
| 170.0000 | Juliet (Secret Service DC area only paired with 408.025) |
| 165.2125 | Mike (Secret Service/WHCA) |
| 166.7000 | November (WHCA) |
| 164.8875 | Oscar (Secret Service/WHCA) |
| 164.4000 | Papa (Secret Service/WHCA) |
| 166.5125 | Sierra (WHCA) |
| 164.6500 | Tango (Secret Service/WHCA) |
| 167.0250 | Whiskey (WHCA paired with 408.025 at Camp David) |
| 162.6875 | Yankee (WHCA) |
| 171.2875 | Zulu (WHCA) |
| 166.4625 | Treasury Common |

**US Secret Service Uniformed Division**

| | |
|---|---|
| 407.675 | White |
| 414.675/418.150 | Yellow |
| 414.800 | Blue |
| 414.850/418.800 | Brown |
| 415.100/418.325 | Black |
| 415.650/419.100 | Silver |
| 415.675/419.075 | Gold |
| 415.750/407.875 | Green |
| 415.800 | Violet |
| 415.975/419.725 | Red |
| 418.125 | Lavender |
| 418.350 | Gray |
| 418.775 | Orange |
| 414.950/419.075 | Radio Communications Branch |

**Possible Trunking System** (Nationwide Usage)
406.450/418.375 407.125/418.275 408.850/418.400 408.875/418.500 408.925/418.525

**Possible UHF Wideband Assignment**
407.675/415.675 White/Gold

**Miscellaneous Frequency Assignments**
36.21 41.17 41.19 41.85 41.87 164.250 164.750 164.800 164.9875 165.2625 165.3375 165.3625 165.3875 165.4125 165.4875 165.5125 165.650 165.6875 165.850 165.900 166.050 166.200 166.4875 166.5625 166.5875 166.6375 166.800 167.900 168.125


Pictures courtesy of Secret Service

## TABLE TWO: FEDERAL FREQUENCY ALLOCATIONS: 168-168.9875 MHZ

| | |
|---|---|
| 168.0000 | Air Force, Army, ATF (Nationwide), Corps of Engineers, Consumer Products Safety Commission, Customs, Energy Department, Federal Law Enforcement Training Center, Health and Human Services, Housing and Urban Development, NASA, Navy, Post Office, Secret Service (Nationwide), US Information Agency, Veterans Administration |
| 168.0125 | Interior Department (Nationwide) |
| 168.0250 | Forest Service (Nationwide-Law Enforcement), National Interagency Fire Center/National Incident Radio Support Cache (Law Enforcement) |
| 168.0375 | (No reported activity) |
| 168.0500 | Bureau of Land Management (Nationwide), Forest Service (Region 3/5/6), National Interagency Fire Center/National Incident Radio Support Cache (USFS Tactical 1), US Information Agency |
| 168.0625 | Forest Service (Nationwide) |
| 168.0750 | Bureau of Land Management, FBI, Forest Service (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (Command 3 repeater out/in 170.425) |
| 168.0875 | Agricultural Research Service, Forest Service (Nationwide-Law Enforcement), Soil Conservation Service |
| 168.1000 | Agriculture Research Service, Bureau of Land Management (Nationwide), FBI, Forest Service (Region 6/Nationwide-Law Enforcement), National Interagency Fire Center/National Incident Radio Support Cache (Command 2 repeater out/in 170.450) |
| 168.1125 | (No reported activity) |
| 168.1250 | Agriculture Department (Nationwide), Agriculture Extension/Research Service, Animal/Plant Health Inspection Service, Corps of Engineers, FBI, Forest Service, Geologic Survey, National Science Foundation, Navy, Secret Service |
| 168.1375 | (No reported activity) |
| 168.1500 | Agriculture Department (Nationwide), Animal/Plant Health Inspection Service, Bureau of Land Management, FBI, Forest Service |
| 168.1625 | Agriculture Research Service, Soil Conservation Service (Nationwide) |
| 168.1750 | Agriculture Department (Nationwide), Agriculture Research Service, Animal/Plant Health Inspection Service, Bureau of Land Management, FBI, Forest Service (Regions 2/6/8) |
| 168.1875 | (No reported activity) |
| 168.2000 | Agriculture Department (Nationwide), Bureau of Land Management (Nationwide), Forest Service (Regions 1/2/3/6/8/9), National Interagency Fire Center/National Incident Radio Support Cache (USFS Tactical 2), National Park Service |
| 168.2125 | (No reported activity) |
| 168.2250 | Air Force, Army, Bureau of Land Management, Energy Department, FBI, Fish and Wildlife, Geologic Survey, Interior Department (Nationwide), National Park Service, Post Office, State Department |
| 168.2375 | (No reported activity) |
| 168.2500 | Bureau of Land Management (Nationwide), Interior Department (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (Interior Tactical 3), Navy |
| 168.2625 | (No reported activity) |
| 168.2750 | Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Corps of Engineers, Energy Department, FBI, Geologic Survey, Interior Department (Nationwide), NASA, National Galley of Art, Post Office, Smithsonian Institute, TVA |
| 168.2875 | (No reported activity) |
| 168.3000 | Bureau of Indian Affairs, Bureau of Land Management, Energy Department (Nationwide), FBI, Fish and Wildlife (Nationwide), Geologic Survey, Interior Department (nationwide), National Park Service, Soil Conservation Service |
| 168.3125 | (No reported activity) |
| 168.3250 | Bureau of Indian Affairs, Bureau of Reclamation, Center for Disease Control, Corps of Engineers, Energy Department (Nationwide), FBI, Forest Service (Region 5), Interior Department (Nationwide), National Park Service, Post Office, TVA, Veterans Administration |
| 168.3375 | (No reported activity) |
| 168.3500 | US Government common use frequency (all agencies), also 408.400/418.075. National Interagency Fire Center/National Incident Radio Support Cache. |
| 168.3625 | (No reported activity) |
| 168.3750 | Bureau of Indian Affairs, Bureau of Land Management, Bureau of Reclamation, Energy Department, FBI, Interior Department (Nationwide), National Park Service, Navy |
| 168.3875 | (No reported activity) |
| 168.4000 | Bureau of Land Management, Bureau of Mines (Nationwide), Interior Department (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (Command 4 repeater in/out 166.6125) |
| 168.4125 | NASA (Nationwide) |
| 168.4250 | Bureau of Land Management (Nationwide), Bureau of Prisons, FBI, Geologic Survey, Interior Department (Nationwide), Soil Conservation Service |
| 168.4375 | (No reported activity) |
| 168.4500 | Energy Department (Nationwide), NASA |
| 168.4625 | (No reported activity) |
| 168.4750 | Bureau of Indian Affairs, Bureau of Land Management (Nationwide), Energy Department, Geologic Survey, Interior Department (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (Command 6 repeater out/in 173.8125), National Park Service, TVA |
| 168.4875 | (No reported activity) |
| 168.5000 | Bureau of Indian Affairs, Bureau of Reclamation (Nationwide), Coast Guard, Energy Department, EPA, Geologic Survey, Interior Department (Nationwide), National Park Service, Office of Surface Mining, Post Office, Veterans Administration |
| 168.5125 | (No reported activity) |
| 168.5250 | Bureau of Indian Affairs, EPA, Fish and Wildlife, Indian Health Service, Interior Department (Nationwide), National Park Service, Post Office, Veterans Administration |
| 168.5375 | Interior Department (Nationwide) |
| 168.5500 | Army, Bureau of Land Management (Nationwide), Geologic Survey, Interior Department (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (ICS call up and smoke jumper use), National Park Service |
| 168.5625 | Interior Department (Nationwide) |
| 168.5750 | Bureau of Land Management, Bureau of Reclamation, Energy Department, Fish and Wildlife, General Service Administration, Geologic Survey, Interior Department (Nationwide), International Border Water Commission, National Park Service, TVA, Veterans Administration |
| 168.5875 | (No reported activity) |
| 168.6000 | Agriculture Department (Nationwide), Bureau of Land Management (Nationwide), Forest Service (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (USFS Tactical 3) |
| 168.6125 | (No reported activity) |
| 168.6250 | Agriculture Department (Nationwide), Air Force, Bureau of Indian Affairs, Bureau of Land Management, Forest Service (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (Air Guard), National Park Service |
| 168.6375 | Forest Service, Interior Department (Nationwide) |
| 168.6500 | Agriculture Department (Nationwide), Animal/Plant Heath Inspection Service, Energy Department, EPA, FBI, Forest Service (Nationwide), National Interagency Fire Center/National Incident Radio Support Cache (Standard Flight Following) |
| 168.6625 | Soil Conservation Service |
| 168.6750 | Agriculture Department (Nationwide), Animal/Plant Heath Inspection Service, Bureau of Land Management, FBI, Forest Service (Regions 3/6) |
| 168.6875 | (No reported activity) |
| 168.7000 | Agriculture Department (Nationwide), Bureau of Land Management (Nationwide), FBI, Forest Service (Regions 2/6/9), National Interagency Fire Center/National Incident Radio Support Cache (Command 1 repeater out/in 170.975) |
| 168.7125 | Forest Service |
| 168.7250 | Agriculture Department (Nationwide), Animal/Plant Health Inspection Service, FBI, Forest Service |
| 168.7375 | Forest Service, Interior Department (Nationwide) |
| 168.7500 | Agriculture Department (Nationwide), Bureau of Land Management, Energy Department, FBI, Fish and Wildlife, Forest Service (Region 8), Geologic Survey, National Park Service, Veterans Administration |
| 168.7625 | Forest Service |
| 168.7750 | Agriculture Department (Nationwide), Bureau of Land Management, FBI, Forest Service (Regions 2/4/6/8) |
| 168.7875 | (No reported activity) |
| 168.8000 | Army, Bureau of Indian Affairs, Energy Department, FBI, General Services Administration, NASA |
| 168.8125 | (No reported activity) |
| 168.8250 | FBI, Immigration and Naturalization Service (Nationwide), Bureau of Prisons |
| 168.8375 | (No reported activity) |
| 168.8500 | Bureau of Land Management, EPA, FBI, Immigration and Naturalization Service (Nationwide) |
| 168.8625 | Coast Guard (Nationwide), Drug Enforcement Administration (Nationwide), FBI (Nationwide), Immigration and Naturalization Service (Nationwide), US Marshals Service (Nationwide): OCDETF |
| 168.8750 | FBI, Immigration and Naturalization Service (Nationwide) |
| 168.8875 | (No reported activity) |
| 168.9000 | FBI, Immigration and Naturalization Service (Nationwide) |
| 168.9125 | Justice Department (Nationwide) |
| 168.9250 | FBI, Immigration and Naturalization Service (Nationwide), Bureau of Prisons |
| 168.9375 | Justice Department (Nationwide), NASA (Nationwide) |
| 168.9500 | FBI, Immigration and Naturalization Service (Nationwide) |
| 168.9625 | (No reported activity) |
| 168.9750 | Bureau of Land Management, FBI, Immigration and Naturalization Service (Nationwide), Interior Department (Nationwide), Bureau of Prisons |
| 168.9875 | (No reported activity) |

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# Trunking Theory 101

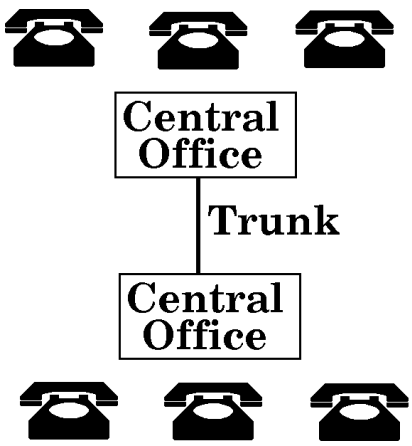
More and more public safety agencies are moving to trunked radio systems, making it difficult for scanner listeners to follow the action. Newcomers to trunking need a good introduction to all the terminology and equipment, and even old hands have a question now and then. So whether you're new to scanning trunked systems or you've been doing it for a while, *Tracking the Trunks* will guide you through the maze of current and future trunking systems.

## What is Trunking?

"Trunking" is a word borrowed from the telephone system to describe a large number of users sharing a much smaller number of communication paths. The wires from your home telephone, along with hundreds of others, connect to a local "central office." Your central office connects with other central offices around the country by way of "trunks," which are really just pairs of copper wires (or these days, strands of glass called fiber optics).

When you pick up the phone and place a long distance call, your central office assigns one of its idle trunks to your call, linking you to the destination central office. That trunk remains dedicated to you for as long as your call lasts. When you finally hang up, the trunk returns to idle and is available for another call.

Because your phone sits idle most of the time (unless you have teen-aged children), just like all the other telephones in your neighborhood, the telephone company doesn't have to go to the expense of having a trunk between central offices for every telephone. Since any particular telephone only needs a trunk while a call is in progress, the phone company can share these trunks among all the telephones. By examining the average and peak number of calls made through your central office, the phone company can figure out how many trunks they actually need. This number will be much lower than the total number of telephones, since they only need enough trunks to prevent someone from getting an "all circuits are busy" message.




**Many users share a common trunk.**

As an aside, this plan worked fine until telephone calls started lasting several hours rather than the usual ten or twenty minutes. Planners at the phone company didn't expect long modem calls to Internet Service Providers, and so many exchanges began running out of idle trunks in the early evening during prime web-surfing hours. This is also why it's so difficult to get through to areas that have suffered from earthquakes or other natural disasters. Even when the phones are working, all of the trunks connecting the local central offices to the outside world are in use as frantic relatives try to reach their loved ones.

In the case of radio, the scarce resource is not wires, but frequencies. To illustrate the problem, at any particular time in a large city like Los Angeles or Chicago there are hundreds of police officers on duty who all need to stay in contact with a dispatcher. If each officer had to have his or her own exclusive radio channel, we'd run out of room in the available frequency bands before we could equip everybody. It would also be very wasteful, since those radio channels would be idle most of the time.

## "1 Adam 12"

So historically these departments use a handful of radio channels, with one chosen as the common dispatch channel that all the mobile users tune to and listen for their call sign. Everyone can hear everyone else on the channel, and everyone has to wait for his or her turn to speak.

Remember the television show "Adam 12"? Los Angeles Police Officers Malloy and Reed had to listen for their call sign on the dispatch channel, which was often very busy. "1 Adam 12, 1 Adam 12, see the man, 1451 Western Avenue." Radio messages had to be kept short, since many other patrol cars were also listening to the channel, waiting for their turn to be called or to radio in a report. When a conversation was more involved, the officers were told to "switch to Tac-2," where Tac-2 (tactical channel two) was a different, less busy frequency that could be used without delaying other urgent radio messages on the main channel.

Because all the patrol cars had to first use the dispatch channel, if an officer had an important message to deliver while another car was using the channel, they would have to wait. It would be helpful to allow the waiting car to immediately use Tac-2, or some other idle radio channel, to get the message through more quickly.

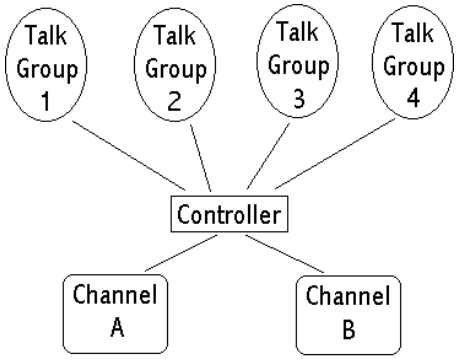
This is the idea behind trunking.

## Waiting for Service

Imagine waiting with a group of friends for a table at a crowded restaurant. You go up to the hostess and give her your name, and she puts it on a list with a bunch of other names. If all the tables already have people at them, you wait. When a table is ready the hostess announces your name over the loudspeaker and you and your friends follow her to the table she selected for you (probably the first one that became available).

The operation of a trunked radio system is very similar to this crowded restaurant. You and your friends are in a "talk group," and when you want to talk to your friends you first have to request a channel assignment from a computerized "hostess" that runs the system. The computer will make you wait until a channel is free, then publicly announce your "name" (really your talk group) and the assigned channel that it selected. You and all your friends then switch to that channel and you can proceed with your conversation.

Fundamentally there are two types of trunking. The first, called *message trunking*, is when the same channel is held for the entire conversation. This is usually done just for telephone calls or other special communica-




**Many users share common channels.**

tions and is the norm in cellular telephone systems.

The more common type is *transmission trunking*, where the channel is held only for the duration of one transmission. A conversation that takes place over several transmissions may actually occur on several different radio channels because the controller may assign a new channel every time someone presses their push-to-talk button. This is the most efficient way to share radio channels, since other people can use the channel during pauses in the conversation, but it's also what makes it so difficult for a normal scanner to listen in.

Trunked radio channels carry two types of information. The first, obviously, is the voice portion of the conversation, which can be in either analog or digital format. Analog is currently the most common, so it's readily discerned with existing hobby equipment, but several manufacturers of trunking systems are selling digital voice systems as well. We'll dig into these newer, more complex networks in later columns.

Trunked radio channels also carry control information, which is really just digital data shared between mobile radios and a computerized controller. This data includes channel and user identification information that must be decoded before it can be used.

## Encoded versus Encrypted

As another aside, let's clarify the difference between information that is *encoded* and information that is *encrypted*. Encoding is simply a way of expressing something in a different way for efficiency or reliability or some other technical reason. For instance, these days when you receive a letter from the Post Office you'll see a series of short and tall bars stamped near the bottom of the envelope. Those bars are just an encoded form of your zip code – nothing mysterious or secret, and anyone can decode those bars if they have the coding specification from the Post Office. Encryption, on the other hand, is the deliberate scrambling of information for the purpose of protecting the contents or meaning of the message. Encoding and encrypting are two different things, despite some attempts by manufacturers to equate the two.

In the trunked systems we'll be covering in this column, the control channel information is simply encoded, not encrypted. The specifications that describe the format and content of these channels are available, and companies have used that information to produce products in a legal manner.

In the United States, trunking occurs mainly in three frequency bands. The first, and most popular with new public safety systems, is the 800 MHz and 900 MHz bands. Second are networks in the 450 MHz band, commonly referred to as UHF (Ultra High Frequency). In addition, there is some trunking activity around 150 MHz (also known as VHF or Very High Frequency). The Federal Communications Commission (FCC) limits trunking operations below 150 MHz, in their words, "…because, given favorable propagation conditions, signals on those frequencies can cause interference to stations hundreds or thousands of miles distant."

## Trunking Equipment

So, what do you need to listen to these signals?

By far the easiest way is to purchase a scanner that is capable of tracking trunked conversations in these bands. There are nearly a dozen different scanners currently on the market that meet this requirement, almost all of which are available from reputable equipment dealers. Detailed reviews of these radios may be found in current and back issues of *Monitoring Times* magazine.

If you're looking for a handheld unit, Radio Shack markets the PRO-91, PRO-92, and PRO-94. Uniden also sells the Bearcat 235XLT and 245XLT radios. You may also run across a PRO-90, which is an older trunk tracker that doesn't appear in the current Radio Shack catalog.

For desktop listening, Radio Shack markets the PRO-2050 and PRO-2052, as well as the mobile PRO-2066. Uniden sells the Bearcat 895XLT.

If you have a computer and want to go beyond the limits of a normal scanner, there are a variety of options ranging from finished products to homebrew solutions. Optoelectronics in Ft. Lauderdale, Florida, sells their OptoCom computer-controlled receiver, which uses software on your personal computer to track the most common types of trunked radio systems, as well as conventional signals. If you already own an Icom or AOR receiver, Optoelectronics also sells an add-on device called the OptoTrakker which will allow you to track trunked radio systems.

You may also use a small external circuit called a *data slicer* to deliver data into your computer, which can decode trunked signals using public domain software programs. These circuits are commercially available as stand-alone boxes or built into larger devices, but require a signal from your receiver called the *discriminator output*.

## Stay Tuned

We'll take a detailed look at all of these equipment and software options in upcoming columns, as well as examining specific trunking systems, their frequencies and related information. For those readers who are already following trunked systems, I'd love to publish frequency lists and talk group assignments that you've worked out.

In the meantime, you're welcome to send me electronic mail at *dan@decodesystems.com*, or check my website at **http://www.decodesystems.com**. Until next month, happy monitoring!

Larry Van Horn, N5FPW
email: larry@grove-ent.com

# Public Safety Frequency Pool

This month's *Service Search* column will be taking an in-depth look at the rest of the public safety frequency allocations we have not covered in previous months. This month we will cover the VHF assignments and next month the UHF assignments. Frequencies marked "PX" can be allocated by any Public Safety Coordinator to any public service organization authorized frequencies from the public safety pool, except the Special Emergency Coordinator.

Frequencies marked "PT" have no coordinator specified and may be assigned by any coordinator certified in the Public Safety Pool. These frequencies are currently being licensed by the Federal Communications Commission. Scanner listeners should be listening for newly allocated splinter channels (VHF 7.5 kHz/UHF 6.25 kHz) to become active in their areas.

| | | | |
|---|---|---|---|
| 37.10 | PX | Base or mobile | |
| 37.18 | PX | Base or mobile | |
| 37.26 | PX | Base or mobile | |
| 39.06 | PX | Base or mobile | 2 watts |
| 39.10 | PX | Base or mobile | |
| 39.18 | PX | Base or mobile | |
| 39.50 | PX | Base or mobile | |
| 39.58 | PX | Base or mobile | |
| 39.82 | PX | Base or mobile | |
| 39.90 | PX | Base or mobile | |
| 39.98 | PX | Base or mobile | |
| 45.08 | PX | Base or mobile | |
| 45.12 | PX | Base or mobile | |
| 45.16 | PX | Base or mobile | |
| 45.20 | PX | Base or mobile | |
| 45.24 | PX | Base or mobile | |
| 45.28 | PX | Base or mobile | |
| 45.32 | PX | Base or mobile | |
| 45.36 | PX | Base or mobile | |
| 45.40 | PX | Base or mobile | |
| 45.44 | PX | Base or mobile | |
| 45.48 | PX | Base or mobile | |
| 45.52 | PX | Base or mobile | |
| 45.56 | PX | Base or mobile | |
| 45.60 | PX | Base or mobile | |
| 45.64 | PX | Base or mobile | |
| 46.52 | PX | Base or mobile | |
| 46.54 | PX | Base or mobile | |
| 46.56 | PX | Base or mobile | |
| 46.58 | PX | Base or mobile | |
| 153.740 | PX | Mobile | |
| 153.7475 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.755 | PX | Mobile | |
| 153.7625 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.785 | PX | Mobile | |
| 153.7925 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.800 | PX | Mobile | |
| 153.8075 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.815 | PX | Mobile | |
| 153.8225 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.845 | PX | Mobile | |
| 153.8525 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.860 | PX | Mobile | |
| 153.8675 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.875 | PX | Mobile | |
| 153.8825 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.905 | PX | Mobile | |
| 153.9125 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.920 | PX | Mobile | |
| 153.9275 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.935 | PX | Mobile | |
| 153.9425 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.965 | PX | Mobile | |
| 153.9725 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.980 | PX | Mobile | |
| 153.9875 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 153.995 | PX | Mobile | |
| 154.0025 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 154.025 | PX | Base or mobile | |
| 154.0325 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.040 | PX | Base or mobile | |
| 154.0475 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.055 | PX | Base or mobile | |
| 154.0625 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.085 | PX | Base or mobile | |
| 154.0925 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.100 | PX | Base or mobile | |
| 154.1075 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.115 | PX | Base or mobile | |
| 154.1225 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.45625 | PX | Fixed (20w) or mobile (2w) | Shared with Industrial/Business Pool |
| 154.46375 | PX | Fixed (50w) or mobile (1w) | Secondary shared basis with Industrial/Business Pool |
| 154.47125 | PX | Fixed (50w) or mobile (1w) | Shared with Industrial/Business Pool |
| 154.47875 | PX | Fixed (50w) or mobile (1w) | Shared with Industrial/Business Pool |
| 154.965 | PX | Base or mobile | |
| 154.9725 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.980 | PX | Base or mobile | |
| 154.9875 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 154.995 | PX | Base or mobile | |
| 155.0025 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.025 | PX | Base or mobile | |
| 155.0325 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.040 | PX | Base or mobile | |
| 155.0475 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.055 | PX | Base or mobile | |
| 155.0625 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.085 | PX | Base or mobile | |
| 155.0925 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.100 | PX | Base or mobile | |
| 155.1075 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.115 | PX | Base or mobile | |
| 155.1225 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.145 | PX | Base or mobile | |
| 155.1525 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.715 | PX | Base or mobile | |
| 155.7225 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.745 | PX | Base or mobile | |
| 155.7525 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.760 | PX | Base or mobile | |
| 155.7675 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.775 | PX | Base or mobile | |
| 155.7825 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.805 | PX | Base or mobile | |
| 155.8125 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.820 | PX | Base or mobile | |
| 155.8275 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.835 | PX | Base or mobile | |
| 155.8425 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.865 | PX | Base or mobile | |
| 155.8725 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.880 | PX | Base or mobile | |
| 155.8875 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.895 | PX | Base or mobile | |
| 155.9025 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.925 | PX | Base or mobile | |
| 155.9325 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.940 | PX | Base or mobile | |
| 155.9475 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.955 | PX | Base or mobile | |
| 155.9625 | PX | Base or mobile | Bandwidth not to exceed 11.25 kHz |
| 155.985 | PX | Mobile | |
| 155.9925 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 156.000 | PX | Mobile | |
| 156.0075 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 156.015 | PX | Mobile | |
| 156.0225 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 158.745 | PX | Base and mobile | |
| 158.7525 | PX | Base and mobile | Bandwidth not to exceed 11.25 kHz |
| 158.760 | PX | Base and mobile | |
| 158.7675 | PX | Base and mobile | Bandwidth not to exceed 11.25 kHz |
| 158.775 | PX | Base and mobile | |
| 158.7825 | PX | Base and mobile | Bandwidth not to exceed 11.25 kHz |
| 158.805 | PX | Base and mobile | |
| 158.8125 | PX | Base and mobile | Bandwidth not to exceed 11.25 kHz |
| 158.820 | PX | Base and mobile | |
| 158.8275 | PX | Base and mobile | Bandwidth not to exceed 11.25 kHz |
| 158.835 | PX | Base and mobile | |
| 158.8425 | PX | Base and mobile | Bandwidth not to exceed 11.25 kHz |
| 158.865 | PX | Mobile | |
| 158.8725 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 158.880 | PX | Mobile | |
| 158.8875 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 158.895 | PX | Mobile | |
| 158.9025 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 158.925 | PX | Mobile | |
| 158.9325 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 158.940 | PX | Mobile | |
| 158.9475 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 158.955 | PX | Mobile | |
| 158.9625 | PX | Mobile | Bandwidth not to exceed 11.25 kHz |
| 169 to 172 | PT | Mobile | Low Power wireless mikes |
| 173.20375 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.210 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.2375 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.2625 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.2875 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.3125 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.3375 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.3625 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.390 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |
| 173.39625 | PX | Fixed or mobile | Shared with Industrial/Business pool for remote control/ TM operation |

Jean Baker, KIN9DD

# Bern Radio

Happy New Year! Welcome aboard, everyone, and fasten your seatbelts. Our first stop today is Switzerland, where we will visit Bern Radio, known to us monitors as "Berna Radio." Thanks to Alfred Wasserfallen of Bern Radio for permission to use this material.

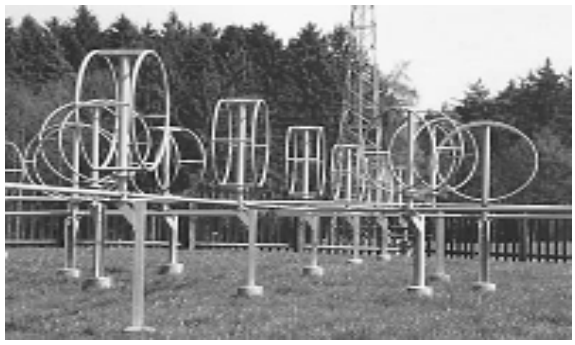
Although we have known Bern Radio as an LDOC (Long Distance Operational Control) station, they also have other capabilities, such as message exchange, marine services with automated radiotelex (SITOR) or voice, faxing, worldwide telephone calling with automated or operator assisted services, and other features.

Bern Radio's receiving station at Riedern is one of the most advanced stations of its kind in the world. The following antennas are currently in operation: four log periodic antennas for long distance reception; seven rhombic antennas, also for long distance reception; one magnetic loop array (multipurpose); one three-element beam, also multipurpose; one crossed dipole for regional reception; one dipole for multipurpose reception; one vertical antenna for regional reception.

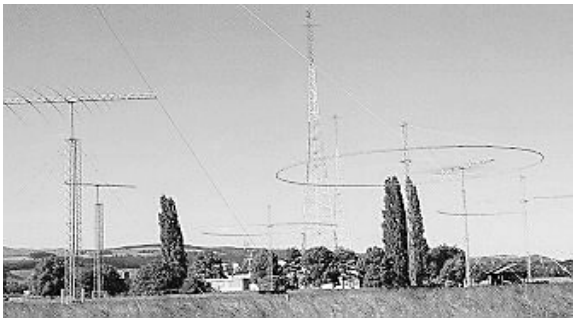
Their shortwave transmitters are located in Prangins, a small village about 30 kilometers east of Geneva. Bern Radio currently operates 25 high frequency (HF) transmitters of up to 30 kW power. Transmitting antennas consist of 10 log periodic for long distance, eight ground plane, also for long distance, six multipurpose rhombic, and five omnidirectional antennas for regional services.

The Riedern and Prangins locations are linked via a fiber optical cable that carries modulation and command signals allowing full remote control of the transmitters.

Using split receive and transmit sites, Bern Radio can provide high quality HF links around the world. In addition, the Swiss national standard time transmitter is located here. Bern Radio also provides transmitters for the international organizations based in Geneva (such as UNHCR-United Nations High Commissioner for Refugees) that operate their own HF services.



*The multipurpose magnetic loop array at the receiving site.*



*The transmitting antennas at Prangins.*

## Bern Radio on Shortwave

Shortwave or satellite communications? Thanks to technological progress, radio telephony or data calls can be easily established today via satellites from practically every corner of the world. Call charges, however, are still relatively high.

Shortwave calls cannot be established at all times of the day due to varying degrees of ionization of the atmosphere. However, shortwave calls are independent of third countries and are therefore particularly desirable in all cases where secure communications are needed. Today the operator can be guaranteed daily contact with Bern Radio via shortwave. Especially when using the fully automatic digital transmission system (DTS) email software, call charges are quite reasonable.

Bern Radio's operators answer all calls between 0500 and 2100. Frequencies used for LDOC transmissions are in upper side band and include:

| | | |
|---|---|---|
| 4654.0 | 6643.0 | 8936.0 |
| 10069.0 | 13205.0 | 15046.0 |
| 18023.0 | 21988.0 | 23285.0 |

Bern Radio is always pleased to receive reception reports from shortwave listeners. They promise to reply to correct reports with a handsome QSL card. Reception reports should contain the following information:

Date and time (UTC); the callsign of the Bern Radio station monitored; if possible the callsign of the remote (aeronautical) station that contacted Bern Radio; exact frequency (QRG); modulation used, i.e., SSB, CW, Sitor, Pactor-1, Pactor-2, Clover (modulations other than SSB are for their other services); signal strength and quality (QSA); any interference heard (QRM); a description of your receiving equipment (receiver, antenna, demodulator; your exact location (QTH); your name and address.

Send your reports to Bern Radio, Riedernstrasse 146, CH 3027, Bern, Switzerland.

Visit Bern Radio on the internet **www.bernradio.ch** - It's a very interesting website!

## More from BWI

Here are some more frequencies and information from Baltimore/Washington International Airport (BWI). The following was contributed by Mike Agner in response to a May 1998 *MT* article called "BeeWee in my Backyard" written by Ron Perron.

| MHz | PL tone | |
|---|---|---|
| 453.800 | 123.0 | Administration (rarely heard) |
| 154.980 | 123.0 | Administration/ops (rarely heard) |
| 154.100 | 123.0 | BWI Fire Dispatch |
| 453.900 | 123.0 | BWI Police |
| 462.1125 | | Butler Aviation (very busy freq) |
| 460.775 | ?* | American Airlines |
| 460.750 | ? | Continental |
| 460.850 | ? | Delta |
| 460.650 | ? | Northwest |
| 460.725 | ? | United |

*? - Unsure of the actual usage, but that's what is listed.

Mike adds that 453.8 and 154.98 seem to be the most active during the day and during storms. He also says in addition to the BWI air traffic control (ATC) freqs we ran a couple of issues ago that 126.750 and 1233.000 have been heard relaying approach info from the tower, but he couldn't hear aircraft replies. Mike gathers that these two frequencies are repeaters for the approach ops.

In addition, there is an ARINC (Aeronautical Radio Inc) 800 MHz trunked system used by USAirways and Southwest. It's a Motorola Type 1 system; fleet map code el p8 seems to work OK. The frequencies are: 860.8875, 859.8875, 858.8875, 857.8875, 856.8875.

That's it for now. See you in February with more aero communications news and views. Until then 73 and out.

Larry Van Horn, N5FPW
email: larry@grove-ent.com

# More Military Trunking Systems

With the release of the Uniden BC-245XLT, military monitoring enthusiasts can now listen to most of the various trunking schemes being used by the Department of Defense in the 138-150 and 406-420 MHz frequency ranges (except digital voice systems).

However, there hasn't been a whole lot of information available on frequencies and talk groups using these various systems. We started with Ericsson EDACS systems the November 1999 *Milcom* column. This month we will look at the various Air Force Motorola trunk systems.

But first, to start our military trunking survey this month we have a field report from well known scanner enthusiast Brian Cathcart.

## The Scanner Dude Checks In

Brian J. Cathcart, KE4PMJ, recently visited southern California on a business trip and provided this update on the **Camp Pendleton Marine Corp Base** trunking system.

Type: Motorola Type 2 analog
System ID: 7100
Frequencies: 406.550 406.950 407.300 407.325 408.200 408.750 409.950 410.150
For users of the BC-245XLT, PRO-94, and PRO-2052: Base = 406.000 Offset = 25-kHz For *Trunker* users, here is the 7100SYS.TXT file: Camp Pendleton Marine Corps Base / B406.0 25-kHz. MAP=22222222 OPTIONS=nVdF PLAN=0

dv406.5500,192,b
v406.9500,1a2,13
v407.3000,1b0,24
v407.3250,1b1,30
v408.2000,1d4,d6
v408.7500,1ea,71
v409.9500,21a,be
v410.1500,222,de

The only talkgroup he monitored sounded like Base Security on ID1936. Brian also passes along the following for **Fort Huachuca** (Sierra Vista, AZ) Motorola ASTRO system.

Motorola Type 2 ASTRO digital
c v406.9500,1c8,ffff
v407.1500,1d8,ffff
v407.5500,1f8,ffff
v407.9500,218,ffff
v408.1500,228,ffff
d 408.3500,238,ffff
v408.7500,258,ffff
v409.1500,278,ffff

**USS George Washington** ***(CVN 73) enters Port Everglades in Ft. Lauderdale, Fla.*** **George Washington** ***was participating in Broward Navy Days Fleet Week '99. U.S. Navy photo by Photographer's Mate 3rd Class Brian Fleske.***

There is at least one analog talkgroup on the system, a simulcast of FHU Airport 124.950 on using ID 49360. The Base is 406.000 and the offset is 12.5-kHz, just in case anyone wants to hear the simulcast and the Astro digital modulation!

Brian also monitored the trunk systems onboard the *USS George Washington* (CVN-73) aircraft carrier when they came to his area for Fleetweek '99. He found two trunked systems in use, one for shipboard operations and the other for port/event coordination. Both were Motorola Type 2 analog systems (at least they only used analog while in port; they may have digital capability). The shipboard system could not be heard very far from the carrier.

*USS George Washington* (CVN-73)
Port/event operations trunk system
System ID 6C36, Single site system
Base is 406.000, Offset 12.5-kHz
Frequencies: 406.850 407.075 408.125 408.700
Shipboard operations trunk system
System ID 352C, SmartZone system
Base is 406.150, Offset 12.5-kHz

Brian found network site number "0" so there may be other network sites in lower decks. This one was used on the flight deck and the hangar underneath.
Frequencies: 406.150 406.950 407.350 408.150

Thanks, Brian, for the outstanding update.

## Motorola Systems

**Air Force Academy, Colorado** (Motorola ASTRO SmartNet)
Frequencies: 406.350 407.150 407.950 408.750 409.025 409.225 409.550 409.750 409.775

**Andersen AFB, Guam** (15 channel Motorola AMSS)
No frequency/talk group information is currently available on this system.

**Andrews AFB, Maryland** (10 channel Motorola system)
Frequencies: 406.350 406.950 407.150 407.425 408.025 408.200 408.750 408.950 409.350 409.725
System notes: Just about everybody on Andrews AFB has a radio on this trunking system including Navy and Marine Corps units at the NAF. Some encrypted transmissions will be heard and it has been reported these are security elements associated with VIP protection. 409.350 and 409.725 are usually used for phone patch operation.

**Arnold AFB, Tennessee** (Motorola Type II ASTRO)
System ID: 4912
Frequencies: 406.750 407.550 408.350 409.150 409.950

**Barksdale AFB, Louisiana** (10 channel Motorola system)
Frequencies: 406.350 406.750 407.150 407.550 407.950 408.750 409.150 409.550 409.750 409.950

**Charleston AFB, South Carolina** (15 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Dyess AFB, Texas** (5 channels reserved)
According to internet reports, Dyess had planned to implement a trunking system, but those plans have now been canceled.

**Edwards AFB, California** (Motorola)
This is a reported 21 channel system. Known Frequencies: 406.350 406.750 407.150 407.950 408.750

**Eglin AFB, Florida** (Motorola)
This is a reported 33 channel system. Known Eglin frequencies: 406.350 406.750 406.950 407.150 407.375 407.550 407.950 408.050 408.175 408.550 408.750 409.150 409.200 409.350 409.375 409.425 409.550 409.775 409.950 410.150
Known Pierce Field frequencies: 408.100 408.650 409.025 409.075 409.225

**Grand Forks AFB, North Dakota** (10 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Hickam AFB, Hawaii** (10 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Hill AFB, Utah** (26 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Holloman AFB, New Mexico**
No frequency/talk group information is currently available on this system. System details unknown.

**Homestead ARB, Florida**
No frequency/talk group information is currently available on this system. System details and status due to base downgrade unknown.

**Keesler AFB, Mississippi** (Motorola Type II SmartNet)
No frequency/talk group information is currently available on this system.

**Lackland/Kelly/Randolph AFB, Texas** (Motorola AMSS)
Belongs to the US Army and will be listed under the US Army trunking systems in a future *Milcom* column.

**Langley AFB, Virginia** (Motorola ASTRO SmartNet)
Frequencies: 406.550 406.750 407.150 407.950 408.550 408.750 408.950 409.150 409.350 409.950

**Luke AFB, Arizona** (12 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Minot AFB, North Dakota** (10 channel Motorola Type II SmartNet)
No frequency/talk group information is currently available on this system.

**McChord AFB, Washington** (8 channel Motorola system)
No frequency/talk group information is currently available on this system.

**McClellan AFB, California**
According to internet reports, McClellan had planned to implement a trunking system, but those plans have now been canceled.

**MacDill AFB, Florida** (5 channel Motorola system)
Frequencies: 406.350 407.150 407.950 408.750 409.550

**McGuire AFB, New Jersey** (Motorola Type II SmartNet)
System ID: 6E05
Frequencies: 406.750 406.950 408.350 408.950 409.350 410.000 413.200

**Mountain Home AFB, Idaho**
According to internet reports, McClellan had planned to implement a trunking system, but those plans have now been canceled.

**Nellis AFB, Nevada** (28 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Offutt AFB, Nebraska** (10 channel Motorola ASTRO SmartNet)
Known frequencies: 406.350 406.750 407.150 407.950 408.750 409.550

**Patrick AFB, Florida** (Motorola)
We have been told that a new trunking system will be installed at Patrick and that Cape Canaveral AFS and the Kennedy Space Center will share this system.

**Pope AFB, North Carolina** (Motorola Type II ASTRO)
No frequency/talk group information is currently available on this system.

**Robins AFB, Georgia** (10 channel Motorola system)
Known frequencies: 406.350 407.150 407.950 408.750

**Scott AFB, Illinois** (10 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Seymour-Johnson AFB, North Carolina** (Motorola Type II ASTRO SmartNet)
No frequency/talk group information is currently available on this system.

**Sheppard AFB, Texas** (Motorola Type II SmartNet)
No frequency/talk group information is currently available on this system.

**Tinker AFB, Oklahoma** (20 channel Motorola system)
No frequency/talk group information is currently available on this system.

**Travis AFB, California** (15 channel Motorola ASTRO system)
No frequency/talk group information is currently available on this system.

**Tyndall AFB, Florida** (10 channel Motorola system)
Known Frequencies: 406.550 407.350 408.150 408.950 409.750

**Vandenberg AFB, California** (10 channel Motorola system)
Frequencies: 407.150 407.550 408.750 408.950 409.150 409.350 409.550 409.750 409.950 410.150

**Westover ARB, Massachusetts** (5 channel Motorola system)
Frequencies: 406.350 407.150 407.950 408.750 409.550
Internet reports indicate this system has not been implemented.

**Whiteman AFB, Missouri** (10 channel Motorola system)
Frequencies: 406.350 406.750 407.150 407.550 407.950 408.350 408.750 409.150 409.550 409.950

**Wright Patterson AFB, Ohio** (10 channel Motorola system)
Frequencies: 406.350 406.550 407.150 407.350 407.950 408.750 408.950 409.550 409.750 409.950.
Base frequency = 406.3500 and Offset = 50 kHz.
Courtesy of MONIX/Milcom.

| Talkgroup Idents | Usage |
|---|---|
| 16 | Ground Control |
| 48 | Unknown User |
| 112 | Civil Engineering/Housing |
| 144 | Unknown User |
| 176 | Fire/Crash |
| 208 | Unknown User |
| 272 | Fire Ground |
| 336 | Unknown User |
| 368 | Fire crosspatch to 154.280 MHz |
| 400 | Unknown User |
| 432 | Unknown User |
| 496 | Base Operations |
| 528 | Air Force Museum |
| 560 | Unknown User |
| 592 | Fire/Medical Dispatch |
| 624 | Unknown User |
| 656 | Fire Ground |
| 688 | Fire Ground |
| 720 | Unknown User |
| 752 | Civil Engineers |
| 816 | Civil Engineers |
| 944 | Base Transportation |
| 976 | POL Aircraft Flightline Refuel Trucks |
| 1008 | Flightline Operations |
| 1040 | Security Car-to-Car |
| 1072 | Flightline Operations |
| 1136 | Flightline Operations |
| 1200 | Unknown User |
| 1232 | Supply |
| 1584 | Unknown User |
| 2352 | Tentative Medical Net |
| 2384 | Unknown User |
| 2480 | Unknown User |
| 2512 | Unknown User |
| 2640 | Unknown User |
| 2704 | Unknown User |
| 3216 | 445 AW Aircraft Maintenance |
| 3248 | Nightwatch (E-4B system) Support |
| 3280 | Tentative 445th Aeromedical |
| 7568 | Unknown User |
| 8016 | Security F-1 |
| 8048 | Security F-2 |
| 8080 | Security F-3 |
| 9776 | Unknown User |
| 9808 | Unknown User |
| 9840 | Unknown User |
| 9904 | Communication Support |
| 10000 | Unknown User |
| 10064 | Unknown User |
| 10128 | Unknown User |
| 10224 | Civil Engineers |
| 10320 | Unknown User |
| 10352 | Unidentified Maintenance Group |
| 10640 | Civil Engineers |
| 10672 | 445AW Communications |
| 10736 | Unknown User |
| 10800 | Civil Engineers |
| 10928 | Civil Engineers |
| 10960 | Fire Department |
| 11024 | Security Secondary |
| 11056 | Security Secondary |
| 11088 | Security Secondary |
| 11216 | Transportation |
| 11248 | 445AW Unit |
| 11280 | 445AW Aircraft Maintenance |
| 11312 | Flightline Operations |

## Fed Trunking Standard Groups

If you are wondering if there is trunking activity in your area the following standard government trunking frequencies are a good place to search.

| Base Frequency | Trunk Group | Mobile Frequency |
|---|---|---|
| 406.350 | Group 1/Channel A | 415.150 |
| 407.150 | Group 1/Channel B | 415.950 |
| 407.950 | Group 1/Channel C | 416.750 |
| 408.750 | Group 1/Channel D | 417.550 |
| 409.550 | Group 1/Channel E | 418.350 |
| 406.750 | Group 2/Channel A | 414.750 |
| 407.550 | Group 2/Channel B | 415.550 |
| 408.350 | Group 2/Channel C | 416.350 |
| 409.150 | Group 2/Channel D | 417.150 |
| 409.950 | Group 2/Channel E | 417.950 |
| 406.550 | Group 3/Channel A | 415.350 |
| 407.350 | Group 3/Channel B | 416.150 |
| 408.150 | Group 3/Channel C | 416.950 |
| 408.950 | Group 3/Channel D | 417.750 |
| 409.750 | Group 3/Channel E | 418.550 |
| 406.950 | Group 4/Channel A | 414.950 |
| 407.750 | Group 4/Channel B | 415.750 |
| 408.550 | Group 4/Channel C | 416.550 |
| 409.350 | Group 4/Channel D | 417.350 |
| 410.150 | Group 4/Channel E | 418.150 |

Well that's it for this edition of *Milcom*. If you have monitored one of the systems above or any other DoD system and have some info to share, we want to hear from you. Send your additions, updates, and corrections either via email (**larry@grove-ent.com**) or at *Milcom*, P.O. Box 98, Brasstown, NC 28902. Until next time, good hunting.

Doug Smith, W9WI
w9wi@bellsouth.net

# Propagation by Groundwave

As DXers, we usually deal with the "skywave." These are signals bouncing off the E layer of the ionosphere, about 80 miles up, and coming back down anywhere from 100 miles to thousands of miles away. They also usually exist only at night – during the day, these reflections don't work.

But AM radio also works during the day, even if you're not within line of sight of the transmitting tower, so there must be some other method for AM signals to propagate. Understanding this mechanism – known as "groundwave" – can help you land more DX and understand why you're hearing the signals you do.

Any wave signal can be "refracted," or bent, when it passes from an area where it travels at one speed to an area where it travels at a different speed. This can be easily demonstrated at home by holding a pencil behind a clear glassful of water. The light waves travel faster in air than in water – so they're bent when they reach the water – and the pencil appears to be "broken" at the water's surface.

The same thing happens to radio signals. They travel faster in open air than in the ground. This is a lucky situation, both for the DXer and for the station; if the waves traveled in straight lines, you'd be unable to receive any station whose tower you couldn't see!

This difference in speed causes signals to tend to travel along the earth's surface. The degree to which they're bent – to which they tend to hug the surface rather than going out into space – depends primarily on two factors. First, is the wavelength. The length of a radio wave is inversely proportional to its frequency – the waves of a station on 600 kHz are 500 meters (about 1500 ft.) long, while those of a station on 1500 kHz are 200 meters (about 600 ft.). Second, is the ground conductivity. This is determined largely by the amount of moisture in the ground and the soil content.

The result is that the daytime coverage of an AM radio station is dependent on three factors: the frequency, the type of terrain between the station and the listener, and the station's power.

Believe it or not, the station power can be a relatively minor factor. Let's take the example of station WSM-650 here in the Nashville area, and a listener in Evansville, Indiana, about 120 miles away.

WSM's transmitter delivers a signal of roughly 20 volts/meter at a distance of 1 km. (It's not necessary to understand what that means, except that it's a standard measure of the amount of signal being transmitted by a station, factoring in the efficiency of the antenna.) The FCC ground conductivity map gives a reading of 4 millimhos/meter for the Middle Tennessee area. (Again, you don't need to know what a millimho is, just that it's a measurement of conductivity.) Checking the FCC charts for groundwave field strength at 650 kHz, we find that WSM should deliver a signal of 3.6 mV/meter in Evansville.

Now, let's assume that for some reason, WSM and WLAC-1510 were ordered to swap frequencies. The two stations continue to radiate the same amount of power, with the same antenna efficiency, so that WSM still had 20 volts/meter at 1 km. At the higher frequency, the field strength will be only 0.44 mV/meter. WSM will be only 1/10 as strong on 1510 as it was on 650.

*This map shows the ground conductivities for most of Mississippi and adjoining states.*

Let's say, instead, that all of western Kentucky was flooded with salt water. This would increase the ground conductivity factor from 4 to 5,000. WSM's field strength at Evansville on 650 kHz would increase to 78 mV/meter, an increase of 20 times! Even on 1510, the signal would still be 68 mV/meter. No wonder XETRA-690 is able to cover Los Angeles from a transmitter site over 100 miles away in Mexico!

Some factors of ground conductivity are beyond the control of the station. Conductivity varies wildly from one part of the country to another. The conductivity here in Middle Tennessee is about 4; in North Dakota, it's 30. No wonder stations like KFYR seem to cover forever! It's also lower in some areas; in northern Maine, the conductivity is only 1.

But other factors can be controlled by careful selection of transmitter site. Places with wetter soil have higher conductivity than drier areas. That's why so many AM stations have built their towers in swamps and along rivers. It's also why so few are found on mountaintops or built-up areas.

## Bits and Pieces

The latest additions to the expanded band are KAXY-1660 Waco, Texas (sports talk), and WTIR-1680 Winter Garden (Orlando), Florida (traveler's information). WTIR has announced plans for additional transmitters around the state, but I've seen nothing in the FCC Public Notices to confirm that. Another Florida expanded-band outlet has switched languages. Spanish-language talk station WRNU-1700 in suburban Miami has become WAFN, an all-sports outlet in English.

Probably the most exotic example of groundwave DX I've ever heard was CHTN-720 Charlottetown, Prince Edward Island, Canada, heard on a car radio in eastern Massachusetts with a fantastic signal this July. What have you heard by groundwave? Write me at Box 98, Brasstown NC 28902-0098, or by email to *w9wi@bellsouth.net*. Good DX!

# OUTER LIMITS

**THE CLANDESTINE, THE UNUSUAL, THE UNLICENSED**

*George Zeller*
*George.Zeller@acclink.com*

# How to Hear Pirate and Clandestine Broadcasts

Some of *MT's* regular contributors are expert pirate radio DXers, but every month we hear from some of the rest of us whose luck at hearing pirates is not as good. Some well tested hints can help us hear these elusive broadcasters. They transmit irregularly, so patience is a virtue when chasing the pirates.

The place to find North American pirates remains 6955 kHz, where most of the shows are transmitted. But, during late 1999, some stations migrated up or down 5 kHz to avoid interference on the band, so it pays to tune around a little bit. Most stations are active on the weekends, although occasional activity pops up during the week. Reception conditions are usually best around your local sunset, but some stations can be heard anytime between about 1300 and 0700 UTC.

About 75% of shortwave pirates use sideband modulation, usually upper sideband but occasionally lower. The remainder use AM. Thus, it's a good idea to bandscan with your receiver set in upper sideband mode. You'll hear the USB stations, and the AM stations will set off a heterodyne "whistle" in your speakers, alerting you to switch back to AM mode. If you can't tune a station in clearly, try lower sideband mode instead.

It helps when you have fresh information about recent pirate activity, so that you can guess about probable operating times. The standard guides are still *The ACE,* with samples available for $2.00 US from PO Box 15830, Chesapeake, VA 23328; and *Free Radio Weekly;* with info available from **http://w3.one.net/~folk/frw.htm** on the internet.

## NASWA and Winter SWL Fest

Rich D'Angelo, North American Shortwave Association (NASWA) Executive Director has announced that organization of the Winter Shortwave Listeners Fest has been assumed by NASWA. North America's largest shortwave DX gathering – organized in the past by the "Gang of Three" consisting of Harold Cones, Kris Field, and Bob Brown – will continue its long-established Fest format under NASWA's new leadership. Richard Cuff and *MT's* shortwave programming expert John Figliozzi are heading the Fest's organizational committee.

This year's 2000 Winter SWL Fest is set for March 10 and 11, as usual at the Holiday Inn in Kulpsville, PA, just north of Philadelphia. The schedule of events always covers pirate DXing, including the mysterious annual appearance of the **Voice of Pancho Villa.** There is no better place to have fun, meet DXers, and enjoy yourself for the weekend. Several *Monitoring Times* staff members will be there as usual, and we hope to see you! Detailed information on the biggest annual family reunion of radio monitors is available at **http://www.trsc.com/winterfest.html** on the internet.

## Cochiguaz Maildrop

Radio Cochiguaz, the most active South American pirate, sends in word that they no longer will be using the Blue Ridge Summit maildrop for reception reports. You can contact them via Casilla 159, Santiago 14, Chile. Their web site is still active at **http://www.geocities.com/Area51/Shadowlands/4401/cochiguaz/html** if you need more information.

## What's on the Air

Our readers heard all of these pirates last month; let us know what you have logged lately! We list programming formats and contact maildrops here. Our list is slightly abbreviated this time, since a trip out of the country squeezed the normal Outer Limits deadline. If you sent in material that you don't see here, look for it in February.

**Betty Boop Radio-** If you like popular music from sixty years ago, this station will soothe your ears. (Providence)
**Blind Faith Radio-** Dr. Naplam spins classic rock tunes. (Merlin)
**Free Hope Experience-** Major Spook's veteran station features elaborately produced comedy. (Blue Ridge Summit)
**Free Radio America-** They have been broadcasting rock music and comedy. (Phone number announced over the air)
**Jerry Rigged Radio-** Recent tests have been mostly rock music. (Providence)
**KIPM-** Complex radio dramas make this one an unusually entertaining catch. (Lula)
**KMUD-** Best heard on the west coast, this one has returned with miscellaneous music. (Lone Pine)
**Midi Radio-** Their genre is computer generated electronic music. (midiradio@yahoo.com e-mail)
**Radio Bingo-** They still feature a bingo game, but it's mixed with sound bytes from other pirates. (Might QSL logs in *The ACE*)
**Radio Free America-** Apparently a new version of this ID has emerged. (Uses a phone number announced on the air)
**Radio Long-** A new one with drama and sketches. (None)
**Radio Metallica Worldwide-** Dr. Tornado's blockbuster 10 kW transmitter is still the most widely heard pirate in North America. (Blue Ridge Summit)
**RBCN-** Radio Bob is back with his clever southern comedy productions. (Lula)
**SWRS-** They remain the best known Europirate, with their own shows plus relays of other stations. Check 3905, 7465, 11470 and 21860 kHz during weekends. (Wuppertal)
**WHYP-** A collage of classic audio clips from James Brownyard on what's now WEYZ in North East, PA. (None)
**WMFQ-** Rock music from the hobby's premier QSL promotion station. (Providence)

## Reports and QSLs

Reception reports to pirate stations require three first class stamps for USA maildrops or $2 US to foreign addresses. Send your letters to PO Box 28413, Providence, RI 02908; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 24, Lula, GA 30554; PO Box 928, Lone Pine, CA 93545; PO Box 293, Merlin, Ontario N0P 1W0; and Postfach 220342, 42373 Wuppertal, Germany.

Your input is always welcome via PO Box 98, Brasstown, NC 28902, or via the e-mail addresses atop the column. We appreciate material sent in this month by **Harold Cones, Newport News, VA, Rich D'Angelo, Wyomissing, PA; Kris Field, Colmar, PA; Joe Filipkowski, Providence, RI; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; Maryanne Kehoe, Atlanta, GA; Bill McClintock, Minneapolis, MN; Cachito Mamani, Santiago, Chile; Niel Wolfish, Toronto, Ontario; and John Young, Lancaster, PA.** Plenty of others also sent in pirate and clandestine information; we'll cover it next month.

Kevin Carey, WB2QMY
lowband@gateway.net

# Beacons Alive and Well!

Well, here we are in the year 2000. Despite claims that beacons are outmoded, low tech and on the verge of extinction, they are still on the air. Granted, there have been many changes on the band, and there will certainly be more to come. However, don't expect beacons to start scrambling their signals or switch to the Internet or satellite broadcasting any time soon. The last I knew, the spectrum below 500 kHz was doing just fine!

This month we'll look at some ways of solving longwave mysteries so that you'll have a more complete logbook going into the new millenium. Our main focus will be on UNIDs – shorthand for "unidentified" signals. Sooner or later, you're going to encounter an UNID as you tune across the beacon band.

## Something New Under the Sun?

When a new signal appears, it could be due to many factors. One thing to consider is seasonal receiving conditions. If you began listening in the dog days of summer, chances are you'll hear many new stations with the onset of winter. These stations may have been there all along, but because of poor conditions, you may not have been able to hear them until now.

Another possibility is that the ID, power level or frequency of an existing station has been changed. Beacon parameters are often adjusted to meet the needs of the navigators they serve. "New" signals may actually originate from established stations that have been modified.

Finally, it is possible to hear a station that operates during the navigation season only (NSO). For example, a small airfield may be closed during the winter and its beacon may be taken off the air. Long periods could go by where nothing at all is heard from these stations.

## ID, Please

The first step in identifying an unfamiliar beacon is to consult a directory such as the *BeaconFinder* (P.O. Box 56, West Bloomfield, NY 14585) or other reliable guide. Be sure to check the guide for any addendum sheets that show last-minute changes or additions. If the guide includes a Foreign section, check that, too. It's possible that the beacon you're hearing is from an offshore foreign territory.

You may also want to check the Internet for station listings. While I'm not aware of an online list for all of North America (or any other continent), there are several smaller lists focusing on specific regions. I suggest doing a keyword search with terms such as "longwave" "beacon" and "frequency" to find these lists. The website **www.airnav.com** may also be of help.

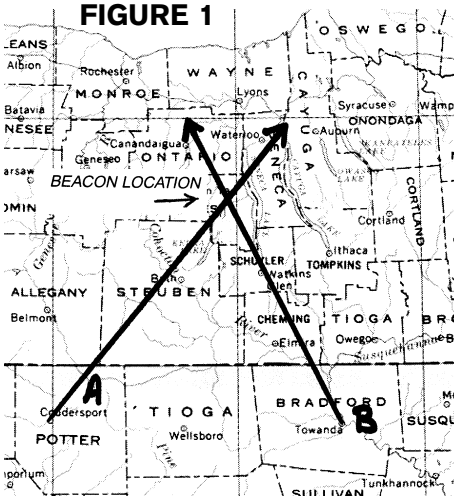
Speaking of the Internet, you could also post a message on a listserver for a station you're trying to identify. Select a list that specializes in utility stations. One of my favorites for longwave is the Lowfer listserver. To join this list, simply send an e-mail message to: *majordomo@qth.net* and put the words "subscribe lowfer" in the message body. In a short time, you should receive an acknowledgement with further instructions.

## Unleashing the Big Guns – DFing

Every now and then a genuine mystery appears. A new station will show up that does not appear in any published frequency lists. Despite the best efforts of experienced listeners, weeks may go by without the location of the station being known. It may be time to break out the direction finding (DFing) tools.

In this scheme, two or more listeners take directional bearings with a loop antenna or the ferrite antenna inside a portable receiver. (Ferrite antennas exhibit a sharp null off their ends when aimed at a longwave or mediumwave station.) Bearings from individual listeners can be plotted on a map, and the intersection of the lines will indicate the approximate location of the beacon (see Figure 1).

**FIGURE 1**




***Direction finding is a powerful tool for locating UNIDs.***

Often, it is possible to coordinate long distance DFing using an Internet listserver as described above. The more participants for DFing, the better.

## Beacon Loggings

The loggings this month are from Dick Pearce (VT). Dick serves as the *DX Downstairs* editor for the *Lowdown* (45 Wildflower Rd., Levittown, PA 19057-3209). He uses an NRD 535 receiver and one of two wire antennas: a 210 ft random wire, and an 850 foot unterminated Beverage antenna (wow!).

**TABLE 1. SELECTED BEACON LOGGINGS**

| Freq. | ID | Location |
|---|---|---|
| 227 | CPC | Whiteville, NC |
| 236 | GNI | Grand Isle, LA |
| 245 | NKT | Cherry Point, NC |
| 249 | RK | Suffolk, VA |
| 254 | LLW | Woodville, NC |
| 257 | SQT | Melbourne, FL |
| 268 | UBY | Bayamo, Cuba |
| 300 | ABL | Abalema, COL |
| 325 | VUP | Valledupar, COL |
| 326 | AKZ | Pensacola, FL |
| 330 | CZM | Cozumel, MEX |
| 339 | A | Havanna, CUBA |
| 344 | PIX | Picture Rocks, IA |
| 344 | ZIY | Georgetown, BWI |
| 353 | JUK | McKinnon, GA |
| 356 | PB | Palm Beach, FL |
| 369 | ZDX | St. John, BWI |
| 375 | BUN | Buenaventura, COL |
| 380 | UCY | Cayojabo, Cuba |
| 387 | PV | Providenciales, BWI |
| 388 | AM | Tampa, FL |
| 392 | VEP | Vero Beach, FL |
| 400 | CI | Koloe, MI |
| 405 | UTX | Jupiter, FL |
| 405 | BVI | Boa Vista, BRAZ |
| 407 | LET | Leticia, COL |
| 410 | PEL | Pelada, Brazil |
| 410 | ECB | El Cabo, COL |
| 412 | UNG | Nueva Gerona, CUBA |
| 413 | MTU | Mitu, COL |
| 413 | 2C | Atkinson Pt., NWT |
| 415 | CBC | Cayman Brac, BWI |
| 420 | CFY | Lake City, SC |

## End Notes

In the November '99 issue, I reported on an anonymous source who said that not all FAA beacons operate on whole number frequencies (i.e., 258, 259, 260 kHz). According to the source, some beacons are listed in federal documentation as operating on .51 kHz "splinter" frequencies (i.e., 260.51 kHz). I asked readers to comment on why this offset would be used for longwave beacons.

David Wilson (AC4IU) came up with an answer that makes perfect sense. According to David, "Some of the LF beacons only modulate (put the CW ID) on the upper sideband. This is a 1020 Hz (1.020 kHz) tone. Thus, if the carrier were on 250 kHz, the keying appears at 250 + 1.020 = 251.020. Thus we have carrier on 250 kHz with on-off keying on 251.020. 250.51 kHz is the center frequency." Thanks, David, for clarifying the ".51" mystery.

# ON THE HAM BANDS ...

**THE FUNDAMENTALS OF AMATEUR RADIO**

*Ike Kerschner, N3IK*
*email: n3ik@hotbot.com*

# Hello, Y2k

Well, here we are in Y2k; did everything hold together for you? Will ham radio exist for another hundred years? Did you make any year 2000 ham radio resolutions? Maybe upgrading, or better yet, to bring two new hams into the hobby this year?!

If we all made an effort to get just one newcomer interested in the hobby, there is no doubt that our hobby will last a long time. As most of you know, lack of new hams is the greatest problem we face. A word of caution: assuming the FCC relaxes code and theory testing standards, it does not necessarily follow that folks will rush to the ranks of amateur radio! It takes more – we must all carry the message to our friends and encourage young and old to enter the hobby.

There is no need to wait for an official invitation to bring folks into the shack and demonstrate ham radio to them. Ask your kid's friends if they would like to talk to someone on your radio; set up skeds and demonstrate how the local repeater works. Above all, inform everyone that the hobby is (a) not expensive, (b) does not require an IQ of 200 plus, (c) is a fun hobby and (d) can be very rewarding by learning a bit about electronics/communications and meeting some darn interesting folks.

And make sure the local club makes an effort to welcome interested beginners. If the local hams are unfriendly, there sure as heck is no reason to join them! Another turn-off is using ham jargon without explaining it; in fact keep explanations simple as well, and on the air use plain language. Don't say, QSL your 59, QTH hr is — etc. Just say, glad to hear I have a good signal, my location is —. You get the idea: now bring some new blood to the ranks.

## One List

While searching the web, I ran across a site called ONELIST. The site is run by Peter Parker, VK3YE, and is a "must check" site for anyone. The Novice Notes section has a lot of information for newcomers. While the section is slanted towards novice operators in Australia, much of the information is of value to anyone new to the hobby; for example, how to handle your first contact and what to expect from the various bands.

At this site you can join a wide variety of communities, not necessarily all ham radio oriented. Each community has several ways of distributing info to its members. You can request direct e-mail, a daily digest of activity or simply go to the site and look at what is going on. Members can post messages of interest to other members, request information, communicate with individual members via e-mail. Let me caution you, though: I joined one community and had 378 e-mails in one day!

Some communities I joined are Heathkit, antennas, old time radio (programs), VHF operating, and business information. Plus, I started a community for model airplanes and within 24 hours started a great friendship with a chap in New Zealand who has very similar interests to mine. I obtained some old time radio drama tapes that I had been looking for, had several replies to a request for Heathkit material, and got a load of information on the T2FD antenna from Mark G0TMT.

Figure one is a direct conversion receiver reprinted with permission from a project site in Peter's ham radio community, where there are a lot of neat projects listed. This one intrigued me and I built the receiver in a few hours out of parts on hand. If you are interested in building it, the only problem you might find is locating a BC548 transistor. Don't worry about it; almost any PNP transistor will work. I used an unmarked transistor from my junk box. Using this receiver in conjunction with a half watt transmitter, I have worked as far as Colorado on 80 meters.

The web address for Onelist is **http://www.onelist.com**

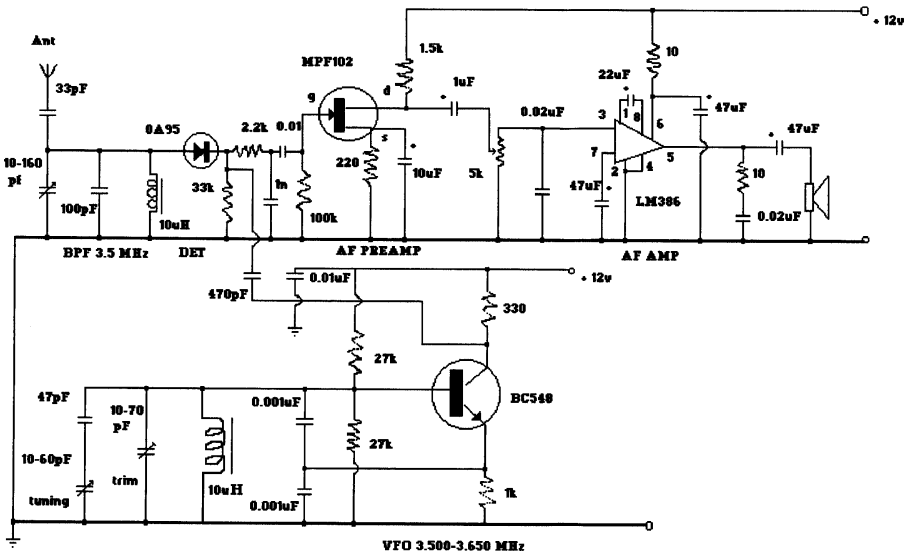
## The Bands are Hot

A few nights ago, ten meters was going crazy with signals from Asia. In just a few hours, stations in Japan, Korea, Siberia, Marshall Islands and the west coast of USA were worked using one watt on SSB to a short wire antenna 40 feet high. Sounds like a darn good DX season coming along! South America has been booming in on 10 and 15 meters on a daily basis since mid October

I get a lot of reports about six meters being open, but at this location, not much activity. Any one out there with information on band openings on six? We did have a few nice contacts on two meters out to about 500 miles, and the band seems fairly active. What I cannot understand is, if two is open, why isn't six? Could be the gods of six meters make sure I am not home when they let my favorite band open!

Happy 2000 every one, see ya next month. 73 de Ike, N3IK

## 80 METRE DIRECT CONVERSION RECEIVER




***Notes:***

***1. Build VFO in separate box for best stability.***

***2. Transistor radio variable capacitors were used in the prototype. Stability is acceptable with these.***

***3. The 10□H inductors are both commercially-made RF chokes.***

***4. A ceramic resonator oscillator (using a 3.58 MHz ceramic resonator) could be used instead of the free-running VFO shown.***

***5. If there are problems with carriers from 7 MHz broadcast stations, add an extra tuned circuit to the front end.***

***6. Almost any construction method can be used – the author used perforated matrix board.***

Clem Small, KR6A
email: clemsmal@bitterroot.net

# Antennas and the New Century

What are the directions that the evolution of antenna design and application are likely to take in the 21st century? For many years we have had the basic designs such as the loops, dipoles, groundplanes, slots, horns, phased and parasitic beams, helical beams, LP-arrays, and a various other designs which provide the basis for the evolution of most of our "new" antenna designs.

Perhaps the controversial idea of fractal antennas will bear fruit, perhaps not, but even fractals seem to be constructed primarily in terms of the old basic designs. For the most part sophisticated "new" antenna designs seem to be insightful applications of established principles rather than the introduction of a really new design.

## Above the HF Band

Increased utilization of UHF and microwave frequencies, and modern printed-circuit construction techniques has led to considerable work towards reducing antenna size. And as we see the proliferation of devices such as cell phones, wireless computer mice, and e-mail supported by wireless modems, there will be more and more impetus to employ smaller antennas. Designs such as microstrip antennas (etched into the printed circuit foil) and embedded antennas (attached to the circuit board as a small component) will be called on with greater frequency.

Antenna-design engineer Rob Hill, speaking at the 1999 ARRL-sponsored Pacificon Antenna Seminar, told those attending that "Antenna Technology is entering an exciting new horizon. No longer are antennas considered a stand-alone item to be added externally to a digital or analog communications system. Today's antennas are a new breed. Today's antennas are embedded into the products that use them."

Hill went on to display contemporary cellular phones with obvious whip antennas, and then showed some designs for the future with no antenna visible at all (fig. 1). The antenna of the future is not just hidden inside the case; the antenna is actually a fairly small component which is soldered in place (embedded) on the circuit board just as if it were an IC, resistor or capacitor in the phone's circuit. It seems likely that antennas will shrink toward some minimum as the demand by the consumer for the convenience of smaller and more convenient radio devices continues.

## Trends in HF Antenna Work

Hill's predictions were aimed primarily at antennas used at the UHF and higher frequencies. What will be the trends in antenna design and application on the high frequency (HF) bands?

Remember that when satellite communications first became practical there were predictions of the demise of the HF band. With such reliable communications as that provided by satellites who would need the antiquated HF frequencies? But with a little further thought on the vulnerability of satellites to catastrophic failure from various causes, it seemed unwise to ignore the potential of the HF band as a satellite-communication backup.

And, of course, history has consistently proven that the HF band is a worthwhile medium for communications in its own right. A bit of listening to the HF band makes it obvious that it is still alive and well. In view of these facts commercial designers are busily working at refining traditional communications systems and implementing new ones for this band.


**FIG. 1.** *(A) A "last century's" cellphone with a short whip antenna, and (B) a 21st century cellphone with an embedded antenna. (Can't see the antenna? That's the point.)*

It seems likely that new modes of operation with increased reliability and security of communications may drive much of the HF antenna work in the future. Consider, for instance, that a recent American Radio Relay League bulletin reported that, according to Dewayne Hendricks "... in the future individual ham bands will be irrelevant, and that analog communications will be 'an anachronism!'"

Hendricks also predicted that the wave of the future could be ultra wide band (UWB) communications – a method in which the spectrum is shared simultaneously among a large number of users, and no separate bands need be assigned to specific users. Appropriate frequency range for communications desired at any particular moment would be chosen by software-driven equipment and spectrum-sharing protocols.

The automated frequency-selection aspect of the process just described will lend itself to choosing appropriate antennas for the propagation path available for the frequency range selected. Automated selection of a desired radiation-reception patterning could, for instance, choose between a near-vertical incidence skywave (NVIS) antenna for short-haul work, a beam with appropriate vertical take-off patterning for a DX path, or a non-directional antenna for broadcasting.

Another system, sometimes called "link quality assessment," programs receivers and transmitters at different geographical locations in a communication system to frequently query one another on various channels. In this way they maintain a current log of the quality of the communication paths on the channels available to them for message routing. Then, when communications is to be established, the log is automatically consulted by the system, and the channel offering the best communication link is utilized.

It goes without saying that, with such systems in the new millennium, computers and digital control systems will be even more in evidence than they are now. The adaptive enhancements to radio communications controlled by computer, or logic circuits, will include selecting appropriate power levels as desired path length or propagation conditions change, controlling transmission modes,

and nullling out interfering signals automatically.

Obviously such sophisticated systems will include a function for the selection the antenna most appropriate for the chosen path. The choices will depend on what is to be required of the antenna system (NVIS, DX, or broadcasting, etc.), and will be similar to those described above for UWB systems already discussed. In any highly-automated system an adaptive antenna design, in which some of the antenna properties are controlled by the received signal, should also have much to offer.

### Lest We Forget

Making predictions as to what new antenna designs we'll see in the future is risky business. On the other hand it seems safe to reiterate that traditional designs, such as the halfwave dipole, quarterwave groundplane, Yagi-Uda, curtain antennas, and the others that have been with us for so long, will be with us through the 21st century and beyond. They do their job well, and their proven reliability and adaptability to countless communication situations in the past offers elegant testimony to the durability of these classic designs. We haven't even begun to see the last of those old friends.

With that said, 21st century, here we come!

## RADIO RIDDLES

### Last Month:

I said: "There are antennas called "phantom antennas"; their name sounds as if they are unreal, or no antenna at all. Then there are "Real McCoy antennas," which sound like they must be very real antennas. Just what are these real or unreal antennas anyway?

Well, the phantom antenna isn't much of an antenna for receiving or transmitting. It is a shielded circuit which emulates the feedpoint impedance (they're not just a resistance like a dummy load) of a particular antenna, but does no radiation nor reception. A phantom antenna allows circuit adjustments to be made to transmitters, antenna tuners, or receivers without actually encountering on-the-air signals, or putting any signals on the air.

And the Real McCoy? That's a dipole shorter than a halfwave, but still long enough to support decent communications. It's named after Lew McCoy, W1ICP, who has pointed out the virtues of such antennas for folks with limited space.

### This Month:

I don't want to stick you with a riddle that will throw you for a loop, but I'll take a chance and ask you, "what very old, last-century antenna design has been employed for decades as an embedded antenna in countless consumer radios?"

### This Month's Interesting Antenna-Related Web Site:

This month's is <**http://members.aol.com/homingin**/> Submit your favorite antenna web site, and maybe it will appear here with finder's credit to you.

You'll find an answer for this month's riddle; another interesting, antenna-related web site; and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, 73, and have a happy 21st Century.

# RADIO RESTORATIONS

**BRINGING OLD RADIOS BACK TO LIFE**

Marc Ellis
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# Hello Monitoring Times Readers!

I'm delighted to be sitting here at my computer tapping out the first of what I hope will be many "Radio Restoration" columns for *Monitoring Times*. Some *MT* readers may know me as the long-time Antique Radio columnist for Gernsback Publications (I started with *Hands-On Electronics*, continued with *Popular Electronics* when *HOE* became *PE*, and finally served for several months on *PE*'s sister magazine *Electronics Now*).

With my transfer to *Monitoring Times*, I'm looking forward to introducing many new readers to the lure and fascination of restoring antique radio receivers and to encouraging those already in the hobby to get even more involved! It goes without saying that I also welcome those of my old readers who already read *MT* or who, I hope, will eventually find their way to these pages.

The main thrust of the new column will be hands-on restoration work. Together, we will pick up soldering iron and multimeter to restore vintage receivers, test equipment, and related high-interest antique electronics items.

Those of you who may be familiar with my old columns know that I never prepackage completed restorations to write about them after the fact. I prefer to have readers right at the workbench with me as I go through a radio, sharing the ups and downs of the project in real time. You'll be looking over my shoulder as I swiftly and masterfully make a creaky old set functional once more – or as I scratch my head over a restored radio that stubbornly refuses to talk.

*MT*'s Editor Rachel Baughn and I have had several long telephone chats about how best to get this new column started. We decided that the first several issues should be targeted to readers who are new to the antique radio hobby. I'll begin by giving you an overview of the "universe" of old sets out there to be collected.

We'll trace the evolution of broadcast and shortwave radios and discuss typical sets at various points along the path. That way, as you explore radio meets and garage sales in search of your quarry, you'll be able to look at potential acquisitions with a more knowledgeable eye. And you'll be in a position to form some opinions about the types of receivers you'd eventually like to have in your collection.

Once you've acquired an interesting set or two, your thoughts will inevitably turn to restoration. How can you make your discoveries play like new and, hopefully, turn them into showpieces you'll be proud to display in your home? Accordingly, we'll follow up the overview material with some information about how to set up a basic radio restoration workbench: the tools you'll need to start with; the safety precautions you'll need to take; the test instruments you'll need to begin accumulating.

With your workbench established, we'll turn our attention to some generic radio repair techniques; techniques that you'll be using on almost any set you'll be bringing into your shop. These will include the standard housekeeping procedures that may very well bring your set to life with no further attention – or at least simplify and facilitate any later trouble-shooting that may become necessary. We'll also cover simple and effective techniques for carrying out that trouble-shooting.

Once all this ground work is laid, we'll start some actual radio restorations – beginning with simpler sets and gradually progressing to the more sophisticated ones. And I sincerely hope you will have as much fun with all of this as I expect to!

## Our Starting Point

Though radio had its origins in the first years of the 20th century (some seminal discoveries having taken place even earlier), we'll begin our evolution story in the early 1920s, just after the conclusion of World War I. Why this particular starting point? Radio (or "wireless," as it was then called) communications were certainly taking place before that time. However, most of this activity involved point-to-point connections for maritime or military use. Not much of the equipment employed then has survived today, and the little that is now accessible to collectors is very high priced. It's exotic stuff!

However, the development of radio technology – particularly vacuum tube technology – that was stimulated by World War I set the stage for the emergence of the radio broadcasting industry. Of key importance in this development were the inter-manufacturer licensing arrangements set up by the government during the war. These made it possible for competitive firms to pool their rights in the interest of advancing the state of the art.

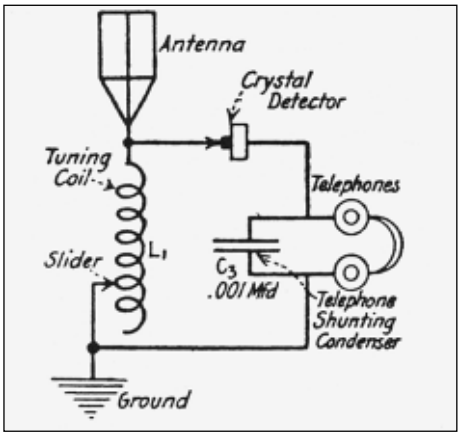
The dawn of radio broadcasting sparked a consumer radio boom that began in the early 1920s and continued until the onset of World War II. The equipment for broadcast listening was manufactured in such vast quantities that quite a lot of it has survived. These are the sets that we love, collect and restore today and, therefore, are the sets we'll be concentrating on in "Radio Restorations."

## Crystal Sets

If asked to name the type of radio in widest use at the start of the broadcast radio boom, many of you would be likely to identify the crystal set. But, actually, advances (and cost reductions) in vacuum tube technology had made the crystal set all but obsolete by the end of World War I. It survived largely as a child's toy and in some of the simplest and least expensive consumer sets.

The crystal detector was one of the first examples of what we now call "semiconductor technology." Because the "crystal" (usually a crystal of Galena, or lead ore) was a much better conductor of electrical energy in one direction than the other (a property called rectification), it could remove the audio program being broadcast from its radio frequency "carrier," thus making it audible in a set of headphones.

But as it happens, the vacuum tubes of the era were far more reliable than any known crystal. As most folks know, operating a crystal detector meant constantly probing the surface of the crystal with a fine wire, known as a cat's whisker, to locate the ever-changing "sweet spot" at which reception would be loudest and clearest. Tubes were not only more sensitive but required no such adjust-




***Schematic of a basic crystal set. The "Telephone Shunting Capacitor" allows detected audio signals to enter the headphones while keeping out residual radio frequency signals.***

ment. Furthermore, they could amplify the radio signal as well as detect it.

If you decide that you have to have a crystal set for your collection, be prepared to spend some money for it. Very few serious crystal sets were made in the 1920s, and even fewer have survived. Though toy crystal sets were manufactured and sold even into the 1960s, these too seem to carry premium prices.

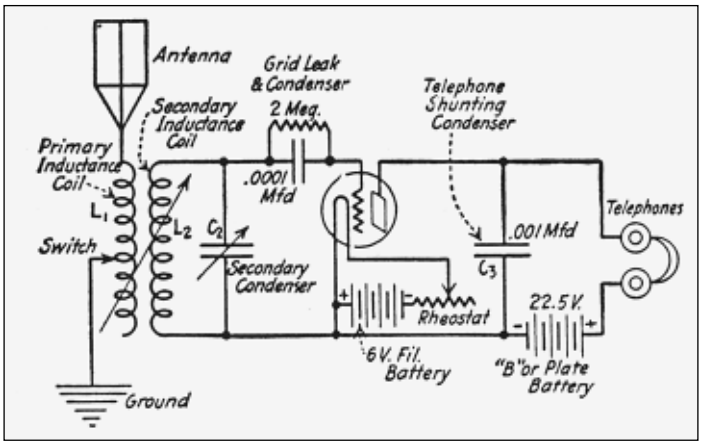
## Vacuum Tube Detectors

The simplest form of vacuum detector you'll encounter in an early broadcast receiver is known as the grid leak detector. We have a lot of ground to cover in this overview, so we won't dwell on theory here. But the radio signal picked up by the antenna is impressed on the grid of a triode (3-element) tube through a coupling capacitor, and then appears in the tube's plate circuit in detected (rectified) form. The signal in the plate circuit is also amplified (made louder) by the action of the tube.

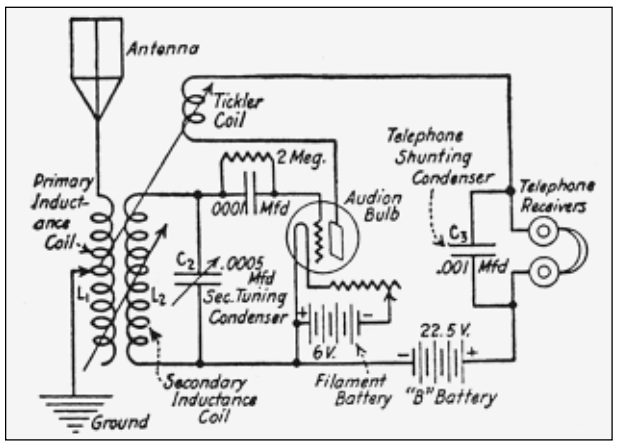
It is a characteristic of this type of circuit that the grid of the tube will become progressively more negatively charged, eventually preventing the tube from operating, unless a special circuit arrangement is made. This arrangement takes the form of a high-value resistor (the grid leak) connected across the coupling capacitor. The negative charge steadily drains off, through the "leak," into the positive side of the filament circuit.

Though the grid leak detector circuit is an important one, you will rarely find it utilized in a commercially-made one- or two-tube set. Such a circuit just doesn't give enough bang for the buck in a set that size. It is not uncommon, however, to find grid leak detectors used in small home-made radios.

Small commercially-made broadcast radios of the early 1920s are apt to utilize a regenerative circuit. The regenerative design, developed by legendary radio inventor Edwin Armstrong, squeezed an amazing amount of performance out of a single tube. It is basically a grid-leak detector, but some of the signal appearing in the plate circuit of the tube was fed back into the grid circuit via a special tickler coil coupled to the main tuning coil. This feedback arrangement meant that the radio signal was amplified over and over again, resulting in tremendous gain.



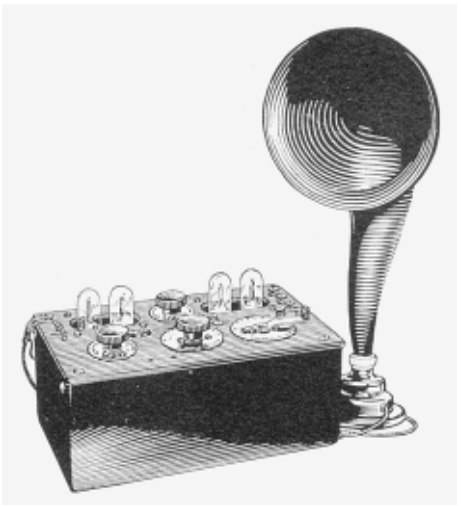

***Simple grid leak detector circuit. The 2-megohm "leak" can be seen connected across the grid coupling capacitor.***




***Regenerative detector is basically a grid leak circuit. However, part of the signal in the plate circuit is fed back to the grid via the "tickler coil," resulting in tremendous amplification.***

To determine if your flea-market or garage-sale radio find is regenerative, first look at the controls and tubes. If it has a limited number of tubes, a control marked "regeneration" or "amplification" and only one tuning or "station selection" control, there isn't much doubt. The "regeneration" or "amplification" control typically operates a mechanical arrangement that changes the physical relationship between the tickler and main tuning coils.

The tubes used in these sets were often dry-cell types (look for the types 11, 12 or 99). However, storage battery types such as the 01-A were also used. Some of the most ubiquitous small regenerative sets were made by Crosley (look for the 1-tube Model 50 and the 2-tube Model 51) and RCA (common are the 2-tube Radiola III and the 4-tube Radiola IIIA). In all cases, one tube is used as the regenerative detector and the others as stages of audio amplification.



***RCA Radiola IIIA used one tube as a regenerative detector followed by three tubes functioning as audio amplifiers.***

Next month, we'll continue our overview with radios using the TRF (tuned radio frequency) circuit.

John Catalano, PhD
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# Talking about TalkPCR

The introduction of PC-only radios, such as WinRadio and the PCR1000, were the next logical extension of computer-controlled radio technology. Their tiny boxes now provide convenience, efficiency, and more desktop space. For me, this new crop of radios also brought a whole new set of decisions to be considered.

For example, do you use the software that comes from the receiver manufacturer? When you first open the box, this is the best way to confirm that the hardware is operational. It is also the best way of getting a "feel" for the receiver's capabilities. But, in many cases, third-party control and database software is also available.

This third-party software falls into two groups: software written for a specific receiver, and software that can control a number of different receivers. This time we will look at a third-party software package, TalkPCR, written specifically for the ICOM PCR1000.

## Out of Necessity

Quite frankly, my ICOM-supplied software (version 1.3) had started acting flaky and unreliable the past few months. I'm not sure of the cause. The problems seemed to be with its management of the serial port. On occasion the radio would stop responding to commands and lock up. This type of problem has been reported by a number of people on the PCR1000 newsgroups on the Internet. It may be related to my installation of Windows 98. These days, with all the different programs which install and run in the background (anti-virus, multimedia, system diagnostics, to name a few), I'm surprised anything runs cleanly!

Being a slightly busy guy, I usually listen while I work. So every time I had to reboot the system to unlock the ICOM I not only lost my most recent logging, but also in-progress spreadsheets and word processing documents. Hours of work gone. I either had to find another control program for the PCR1000, or choose between listening and work!

## Stop Talking and Start TalkPCRing

TalkPCR, by QROSoft Ltd., is a program that was often referred to by members of the PCR1000 newsgroup. The functioning demo of TalkPCR, version 1.1 ( the new version should be available by the time you read this) is available for downloading as a 1.36 Mb compressed Zip file on their website at **http://www.mahy.demon.co.uk**.

You will need Windows 95/98 to run TalkPCR. I installed it on my Pentium I MMX, 233 MHz, Hewlett Packard 3266 machine. The basic program, without saved databases, requires 1.7Mb of hard disk space. The Zip must be extracted to a temporary directory via an unzip program, such as PkunZip. Running "Setup" from Windows Start/Run menu will quickly and easily install TalkPCR. Installation of TalkPCR is simply a matter of choosing to which serial port your PCR1000 is connected and turning on your receiver. That's it!

I was equally skeptical but I have been using TalkPCR for the past four weeks and have not had a single lock-up, or near lock-up. Yes! For me, TalkPCR had already completed my objective. But what operational sacrifices would I have to make to get this reliable operation?

## Not big on fancy graphics

**FIG 1** - *Where it all happens - Main Screen of TalkPCR*

Figure 1 shows the Spartan business-end of TalkPCR. As you can see, TalkPCR employs very basic graphics as compared to ICOM's color and graphics extravaganza. However, its simple but adequate layout makes using TalkPCR quick and intuitive. The pulldown help screen is well designed, but goes unused most of the time due to the software's logical implementation.

Let's first look at entering a desired receive frequency. Above the "meter" you will see three buttons. For now, we will click on "Freq." Manual frequency entry is a straightforward matter of clicking on the frequency display in the top left and then entering the desired frequency via keyboard. The mode and bandwith are selected via the two rows of horizontal running buttons at the lower left of the main screen.

Your most-used frequencies can be stored in the eight, on-panel, memory "M buttons," arranged vertically on the lower right. All it takes is a long right mouse clip on an M button. The displayed frequency is stored to that button.

The user has many options to manually tune the PCR1000 with TalkPCR. The large knob at right center of Figure One acts as a mechanical tuning knob. With a left-click, and hold, your mouse movements tune the receiver. Moving left raises the tuned frequency by a Step amount. The keyboard Up/Down arrows accomplish the same job. The Step amount is set via a pulldown menu below the tuning knob.

Although we have seen this "knob rotation" control method used by other programs, TalkPCR seems to have a smoother, more natural feel than others. All functions illustrated as knobs, i.e. volume, use this control technique. It's a small touch that makes monitoring more simple and enjoyable.

## Scanning around a frequency

Scanning from the tuned frequency is easily done by setting the squelch and then clicking on a set of triple arrows to the left of the tuning knob. Scan rate is set by the Controls menu in the top command row. This menu opens up a whole range of settings that you can customize for your specific monitoring. There is a lot of power here that we will not cover, but TalkPCR makes using the power simple, accessible and easily understood.

Searching between two frequencies is easily performed by clicking on the Command line "Scanning," and then on "Search." Fig-

**FIG 2** - *Search Mode Screen - scanning between two frequencies*

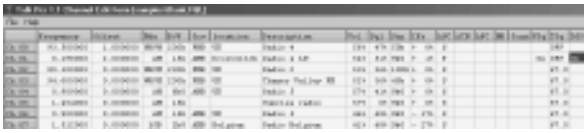

**FIG 3 -** ***The does everything, easy to use Database Screen***

ure two appears and lets you control lots of parameters from the area in the center of the screen. At the top is displayed your growing list of active frequencies, which the search has uncovered. Frequencies which you have chosen to exclude are displayed at the bottom of the screen. Again, operation was smooth and reliable.

## Storing and Scanning

So far, my fears of sacrificing capabilities for reliable performance have been unfounded. But now to the real test – the database. Handling all the parameters that a single intercept entry can possess can be a daunting task for a programmer. What parameters can the user modify on each entry? Which are only universally modifiable? Which are fixed and not under user control?

TalkPCR has a powerful, yet simple and logical database structure and operation. Clicking on "Chan" above the meter puts you into a display of scanning database entries, or channels. Selecting the "Channels" menu on the command line, and then choosing Edit, gives you all the station database manipulation most of us will ever need. Figure Three displays a few lines of the database along with just half of the user definable columns. Here, in the columns, is where the power lies.

Don't worry – if you just want simple logging operations, these columns will set themselves to default values. Or, better still, if you're logging a station via the "St" button to the left of the triple tuning arrows on the Main Screen, all of the panel settings will be transferred to the database automatically. Very simple, right?

But if you want to customize/optimize each channel entry, eighteen possible user defined parameters are available on *each* frequency channel entry. For me, the most important individually set parameter is the squelch level. Noise floor and interference vary with the frequency being received. If you have only one universal squelch level, it will have to be set high enough to silence the noisiest frequency. This can block weak/normal level signals on low noise frequencies, while accommodating the high noise channels.

TalkPCR allows each frequency stored to have an associated stored squelch level, among seventeen other parameters. This greatly minimizes false scan stops, while allowing monitoring of weak stations on clear frequencies. That's just one of the seventeen user accessible fields.

## Even More from TalkPCR

The PCR1000's graphical frequency scan is displayed by clicking the BS (Band Scan) at the bottom center of the main screen (Fig 1). Features such as CTCSS tone squelch and voice squelch are included in TalkPCR, as well as many features we don't have space to mention. All functions I tested performed as indicated, and with an ease of operation that was very impressive.

If you have followed previous monitoring software reviews in this column, you'll remember that the audio recorder feature is usually the one that causes me lots of problems, in some cases locking up the computer. So I was careful to test this feature at the end of my testing.

TalkPCR's audio recorder operates via three self-explanatory buttons, Record, Play Last and Auto Record. You can view a list of the recorded audio which displays frequency, time and other useful info. How did it work? I tried it will the scanning modes we just discussed. It worked flawlessly – and my computer did not crash! The playback audio level was a bit low and seemed slightly distorted, but very usable.

## I guess I'm getting soft

With the exception of one gripe, I cannot find anything I didn't like about TalkPCR. My only "this should be changed" is the fact that when the database is displayed you cannot see a whole entry line without scrolling the screen horizontally. This cause the channel number and frequency to move off the screen. Now, scrolling down the entries can get confusing. I had to change my screen size to 1024 x 768, with much too small characters even on a 17 inch monitor, before the whole line would be displayed. A compromise may be fixing the left five columns which contain critical data, and allowing the rest to scroll.

Since TalkPCR only works with the PCR1000, using your hard-earned databases from other receiver-control program combinations may present a problem. Perhaps that's the price we must pay for easy to use, reliable software. The "I-can do-anything" software products promise operation with almost every receiver on the market. However, they come with a 140+ page instruction book, and require constant tweaking of parameters to make it run.

I suggest that, especially if you use an ICOM PCR1000 as your only receiver, you can't do without TalkPCR. I don't think you will be disappointed

TalkPCR functioning demo and registered version can be downloaded at their website. Registration is a one-time £25 UK pound, which also entitles you to future updates free of charge.

## Towards the Next Millennium

My "to be checked-out" closet is bulging with lots of monitoring related new software and hardware. In coming months we'll look at WinRadio's new Trunking Software. Also, the AOR 8200 portable scanner is a very capable receiver, but with enough keypad functions to make you go crazy. Someone should write a computer program dedicated to the 8200. Well, someone did and we will put it through its paces.

PS – So, how bad was theY2K bug for you? Was it a yawn or a disaster? I'd like to hear your radio/computer related stories. At least we'll all know what to expect next time–

Jock Elliott, KB2GOM
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# Sony's Spectacular FRS U-ceiver

If you've ever been in the market for short-range two-way communication devices, this is a really good time to consider a purchase. If you've looked into the market at all, then you know that the two main alternatives for license-free communications for ordinary citizens are the 27 MHz Citizens Band and the 460 MHz Family Radio Service.

Under perfect conditions, Citizens Band offers the possibility of longer-range communications. It's easy to understand why – CB transceivers (even handitalkies) are generally rated at 4 watts AM transmit power and, if they have sideband capability, 12 watts. On top of that, externally attached base and mobile antennas are legal. So when conditions are really right, it's possible to talk 30 miles or more from a mobile unit to a base using single-sideband. Conversations between AM handitalkies can even range over several miles in ideal circumstances.

The problem is that circumstances are frequently not ideal on CB. When long-range propagation is taking place (after all, this once was a ham radio DX band, and it gets energized by the 11-year sunspot cycle), it can be easier to hear a station a thousand miles away than one across town. Family Radio Service transceivers, by contrast, are limited to 1/2 watt, NO external antennas, and are allocated 14 channels between 462.5625 and 467.7125 MHz.

While the range offered by FRS transceivers (up to two miles, sometimes only 1/2-1 mile) is only a fraction of what CB can deliver under optimal conditions, FRS units are selling like hotcakes, simply because they offer reliable, high-quality communications over predictable distances.

Today's FRS shopper has plenty of choices. There are literally dozens of companies making and selling FRS transceivers, and many of them perform quite well. This column has reported on a number of excellent models.

Recently, however, I tested the Sony U-ceiver, and it incorporates what has to be, hands down, the slickest innovation I've seen in ten years of writing about two-way radios. More about that in a moment; first, let's take a guided tour.

## Quality construction

The Sony U-ceiver measures 2.5 inches wide, about 4.5 inches tall (excluding antenna) and roughly 1-1/8 inch thick and looks very similar in concept to the Icom and Cobra radios, with a sculptured case and a fold-down antenna. On the front of the handitalkie is a grill for speaker and microphone, a Mode button, Up and Down buttons, a small backlit liquid crystal display, a Light/Batt/lock button and a switch for choosing between CTCSS (continuous tone-coded squelch system) tone selection or channel selection.


*The Sony U-ceiver incorporates what has to be, hands down, the slickest innovation I've seen in ten years of writing about two-way radios.*

On the right side of the U-ceiver is a socket for plugging in external 4.5 VDC power. On the top of the unit is a volume control knob that is protected against accidental movement by a metal bale and a rubber cover that can be pulled back to insert a plug for a speaker microphone. A separate power button makes it handy to turn the unit on and off without having to readjust the volume level.

On the left side of the transceiver is a push-to-talk button. On the back of the case you'll find the flip-down antenna and a hatch for inserting three AA alkaline batteries. Overall, I was highly impressed by the fit and finish of the Sony unit, which has water-resistant seals that help to keep out water, moisture, and dirt. My overall impression is that the quality of construction seems a notch higher than any other FRS unit I've tested so far.

In on-the-air tests, I found that the audio on receive was exceptionally good. On transmit, my test partner cautioned me several times not to talk too close to the speaker grill. A distance of about six inches seemed to deliver excellent audio when I was talking. I did not, however, notice any problems with my test partner's transmissions. So, if you've got a big, loud voice like I do, don't "swallow the radio."

The U-ceiver also produced excellent results in our range tests. While it didn't produce the longest range I've ever seen, it was solidly in the top echelon, with only two or three units able to beat it by a small margin.

## Clear channel search

So far, there's a great deal to like about this FRS handitalkie. But here's the really cool part: something called Search mode.

Here's how it works. Everyone in the group chooses the same CTCSS tone (any of 38 on the U-ceiver) and then puts their U-ceiver in Search mode. When one member of the group wants to talk to the others, he or she simply presses and holds the push-to-talk button. The radio then searches for a clear channel. When the unit finds an unused channel, it sends off a call signal to other members of the group, make their units sound an alert signal and puts their radios on the same channel. Your group is then "synched up" to talk on that channel. If no one talks for about 10 seconds, all radios then go back into Search mode until someone from your group decides to transmit again.

Search mode makes group communications in an FRS-rich environment virtually effortless. It takes the worry and confusion out of finding clear channels. In my view, it's a serious advance in making two-way communications better. The only rub: it only works with other U-ceivers.

The suggested retail price on the Sony U-ceiver is $129.95, but discounters may have them for less than $100. For more information, call 1-800-222-SONY or visit **www.sony.com**.

Bob Grove, W8JHD
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# Kaito KA-007 Free-power Radio

The success of the South African Freeplay (formerly BayGen) dynamo-operated radio has led to a number of spinoffs from major and minor companies, including Sony and now Kaito. While hand-cranking a radio may sound a bit antiquated, it actually does work, and it does save on battery bills!

But hand cranking is not a practical, long-term substitute for another continuous power source. While it is great for emergencies, or when the batteries are dead and there is no source of external power, cranked power is limited in its duration of power production.

The crank may be connected to a magneto which, in turn, charges a large capacitor or a battery, or, as in the case of the Freeplay, may power the radio directly as it unwinds. But the capacity is limited; a fully-wound Freeplay radio will run for approximately 45 minutes before it has to be rewound. Fortunately, it can also be powered by replaceable batteries or an AC adaptor.

## Enter the Kaito

Now a tiny competitor to the alternative power radios has emerged. The Kaito KA-007 is only a fraction of the size and weight of the Freeplay (even the new, reduced-size unit), yet has a number of additional features.

It may be powered from its own internal, hand-cranked magneto; it may be fully recharged by an efficient, integrated solar panel; it can be powered from an external source of 4.5 to 6 VDC (AC adaptor included); or it may be operated by three replaceable AA cells. A very nice selection, indeed.

In actual practice, however, the limitations of the hand crank power become apparent; a fast 15 second cranking session (40 turns) resulted in only 3 minutes of playing time. Of course, it is good exercise, and several minutes of cranking will result in considerable extended play time!

Fortunately, just leaving the radio turned off in a lighted room or in sunlight will fully charge its internal nickel metal hydride


(NiMH) storage system for up to 72 hours of play. Or a few hours charging from the AC adaptor will do the same thing.

Sound quality is better than what you might expect from a small speaker – it is crisp, intelligible, and capable of room-filling volume without severe distortion.

## Wide Frequency Coverage...

The KA-007 accurately boasts the widest frequency coverage of any alternative-energy radios on the market at present. The analog dial displays the following ranges: 530-1700 kHz medium wave, 88-108 MHz FM, 145-175 MHz VHF, TV audio channels 2-13, and 6-18 MHz shortwave. That's quite a swath of spectrum!

Sensitivity is quite good on medium and short wave as well as FM, but lacking on the VHF 145-175 MHz range, undoubtedly due to the wide FM detector used for its broadcast reception. Nonetheless, local VHF reception will be adequate, although lack of a squelch control means that listening to two-way communications (ham, public safety) will be fraught with annoying background hiss between transmissions. But monitoring the your local, continuous NOAA weather broadcasts would be quite satisfactory.

## ...In a Crowded Space

But crowding all that spectrum into a tiny tuning dial creates problems of its own. Tuning is very touchy. While there is little backlash from the dial string, the tightly-cramped bands and small tuning knob make fine tuning rather beleaguering. The entire 88-108 MHz FM band appears in a mere half-inch dial spread, and is tuned through with only a 1/3 rotation of the tuning knob!

As with any inexpensive, multiband portable, strong signals produce multiple images, and dial accuracy is approximate.

Three LEDs alert the user to the status of the remaining power (hi or lo), and center tuning of signals. A telescoping whip is used for reception on all frequency ranges except medium wave which uses the conventional internal ferrite rod loop antenna. A 1/8" (3.5 mm) earphone jack doubles as an external antenna connection. However, using an earphone (not included) would disable the jack's antenna function.

The radio comes with an AC charger/adaptor, introductory operating manual, and a small wire antenna for shortwave enhancement.

## The Bottom Line

If you're looking for a competitive DXing machine, look somewhere else. The KA-007 was never intended to be a scanner or a shortwave communications receiver. But if you're looking for a multiband radio that will work anytime, anywhere, on a variety of power sources, and with reliable local AM/FM and weather broadcast reception as well as shortwave, the KA-007 is a very good choice. It is compact, loaded with frequency coverage, automatically recharges itself in sun or room light, and sounds decent. And the price is right.

The new Kaito KA-007 is available for $59.95 plus $5.95 shipping from Grove Enterprises, PO Box 98, Brasstown, NC 28902-0098, (800) 438-8155.

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# Radio Shack PRO-92 Portable Multi System Trunking Scanner

The Radio Shack PRO-92 is a portable scanner capable of monitoring conventional, Motorola trunked (type I, II, and hybrid), Ericsson EDACS trunked, and E. F. Johnson LTR trunked systems. Built in Japan, it is among the first trunking scanners manufactured by GRE for Radio Shack.

The PRO-92 is not a general coverage radio; it tunes the upper portion of the 10 meter ham band and the standard "scanner bands," as well as the 806 - 960 MHz range. It also functions as a "weather alert radio," displaying the level and type of alert from NOAA weather station broadcasts within your reception area. You cannot program specific codes for your location as you can in a Uniden BC278CLT.

## Power to the People

The PRO-92 runs on 9 VDC and its battery scheme is flexible. It is supplied with separate trays for 6 rechargeable and nonrechargeable AA cells. The latter disconnects the batteries when using an external power source.

You can power the scanner from 117 VAC using an optional 9 VDC, 300 mA power supply (Radio Shack #273-1825) fitted with the proper plug. Connecting a power source to the side mounted PWR jack charges the internal batteries when using the proper holder. A current limiter inside the PRO-92 sets the recharge time for standard NiCd cells to about 16 hours. You can operate the PRO-92 while recharging, though it will take longer for a full charge.

You can program the PRO-92 with a computer (interface kit not supplied) or clone one PRO-92 from another using the cable provided.

## Memory

The PRO-92 provides 500 memory channels in 10 banks, numbered 0 - 9. Both channels and banks are numbered differently from other Radio Shack models. The first bank (0), for example, contains channels 000 - 049, the second bank (1) has channels 100 - 149. As you can see, the bank number is used as the first digit of the channel number.

Each memory channel is programmed with a frequency and what Radio Shack calls a "mode." The modes are AM, FM, Motorola Trunked, EDACS, LTR, PL, and DL (digital PL). You can mix combinations of conventional and trunked frequencies within the same bank, but frequencies for each EDACS trunked system must be programmed into their own separate bank.

PL and DPL are abbreviations derived from Motorola's trademarked terms Private Line (continuous tone coded squelch or CTCSS) and Digital Private Line (digital coded squelch). The PRO-92's PL and DPL capabilities are remarkable because the associated code is detected on a signal and displayed almost instantaneously!

Each channel may be programmed with a 12 character label which is displayed along with the frequency. Each memory bank may have its own text label, but bank labels are not displayed while trunking or on channels assigned a PL or DPL code.

A built-in attenuator may be enabled on or off on a per-channel basis, though we didn't need to use it.

## Scanning and Searching

As you might expect, memory banks can be sequentially scanned in any combination. We programmed three banks with conventional AM and FM frequencies, three banks with different Motorola trunked systems, one bank with an EDACS trunked system, and one bank with a local LTR trunked business system.

Our PRO-92 scans all those banks in turn. There is no apparent delay when our PRO-92 transitions between conventional, Motorola trunked, or LTR trunked banks; however, there's a delay of approximately 3 seconds while our PRO-92 is in the EDACS bank.

For trunking, one can program up to 100 talk group IDs in each of the 10 banks. You can lock out talk groups from these lists, and conversations in these groups won't be scanned, but you cannot lock them out while searching (i.e., scanning in the Open mode).

While scanning trunked systems, you can instruct the PRO-92 to "camp out," or hold, on a particular talk group. It will scan all the trunked frequencies in the current bank, stopping only on conversations in that talk group.

## MEASUREMENTS
## RADIO SHACK PRO-92 SCANNER
## S/N 011022

List price $349.99
Tandy Corp.
Fort Worth, TX 76102

Frequency coverage (MHz):
- 29 - 54 (5, 10, 15, 20, 25, 30, 50 100 kHz steps)
- 108 - 137 (AM, 12.5, 25, 50, 100 kHz steps)
- 137 - 174 (5, 10, 15, 20, 25, 30, 50 100 kHz steps)
- 380 - 512 (12.5, 25, 50, 100 kHz steps)
- 806 -960 (cellular omitted, 12.5, 25, 50, 100 kHz steps)

Sensitivity:
- see graphs

RF attenuator:
- 20 dB @ 30 MHz
- 20 dB @ 150 MHz
- 15 dB @ 450 MHz
- 21 dB@ 950 MHz

FM modulation acceptance:
- 12 kHz

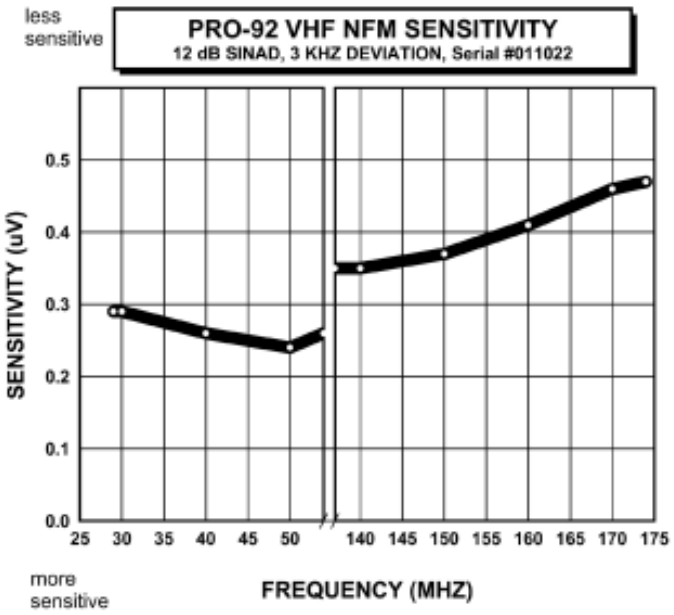
Intermediate Frequencies:
- 257.5, 21.4, 0.455 MHz

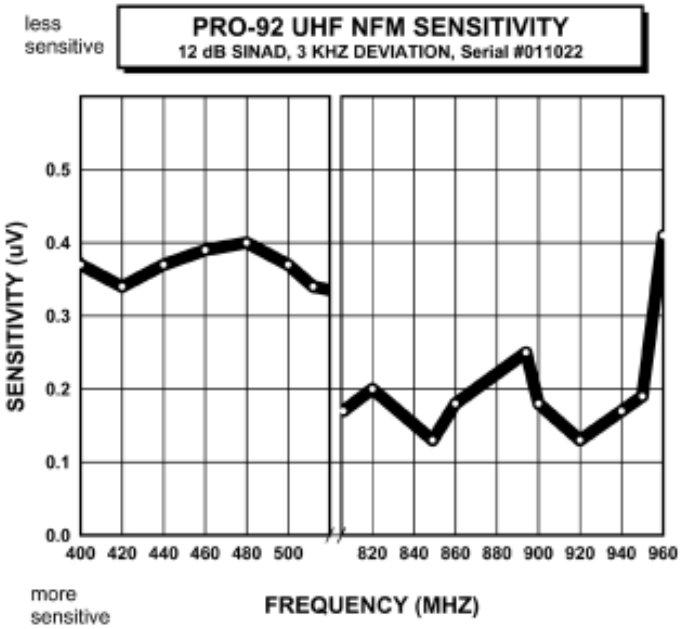
Image rejection:
- 50 dB @ 30 MHz
- 73 dB at 155 MHz
- 64 dB at 400MHz

Audio output power at earphone jack:
- 146 mW @ 10% distortion into 8 ohms

Practical memory scan speed:
- 29 ch/sec., conventional mode

Current consumption at 9 VDC:
- off - 0 mA
- manual - 89 mA
- scan - 89 mA
- full volume - 170 mA
- Battery saver: after 5 seconds in Manual.
- Low battery shutdown at 5.89 VDC or less.




The PRO-92 supports a search with 10 pairs of frequency limits, and you can search multiple ranges sequentially. Up to 50 frequencies may be locked out in each bank. There is no auto store feature.

## Multi Line Display

The PRO-92 is built with a 4-line, dot matrix, liquid crystal display. One may adjust the contrast through a keypad sequence. Pressing another key lights the display, but the lamps cannot be latched on. The green backlighting is too dim to illuminate the entire display. It is useful in total darkness, but our display is often difficult to see during the day unless in a well lighted area.

The display shows frequencies, channel, and other indicators. Even with 4 lines, the PRO-92's display can only show so much. While the PRO-92 is stopped on a signal, the first line shows the channel number and other status information. For trunked channels, the remaining 3 lines show frequency, channel label, and talk group label.

## Subtleties

The PRO-92 is a complex radio and some aspects of the way it works may not be obvious after a quick reading of the owner's manual.

You must program EDACS frequencies in the proper order, in a separate bank, starting with the second memory channel (01) in that bank. If you start programming them at the first channel (00), the PRO-92 won't track them properly.

Some PRO-92 features – for example, the 2 second rescan delay – are implemented for conventional systems and don't function while the PRO-92 is monitoring trunked activity. Bank text labels are not displayed for trunked frequencies. The 4th line on the display shows talk group information instead.

The manual states that priority won't work while trunking, but priority appeared to work while we scanned Motorola and LTR trunked systems. That's a bonus!

The PL and DPL squelch is only effective while scanning in the Closed mode. We could find no way to configure the PRO-92 to sit on a single channel with PL or DPL, and prevent signals without the proper code from opening the squelch. An impractical work-around is to lock out or clear all the other channels in the bank, then press the Scan key.

You can lock out talk groups from being scanned but not from being searched; this makes searching for new talk groups more time consuming.

The Uniden TrunkTrackers support multiple talk group lists per bank vs. one list per bank in the PRO-92. To obtain the same functionality in the PRO-92, you could program the same trunked system frequencies into several channel banks, and program the corresponding talk group lists differently, e.g., one for police, another for fire, etc.

## Performance

Our PRO-92 produces clean, crisp audio. It is sensitive and has excellent image rejection. We did hear cellular phone transmissions in the 51 MHz range when driving within 1/4 mile of cellular phone transmitters.

The PRO-92 and Uniden TrunkTrackers employ different schemes for following trunked conversations, and the merits of one method over the other is hotly discussed over the Internet. The trunked systems we monitored are comprised of 5 - 7 channels, smaller than the monster, megachannel, trunked systems in California and other urban areas.

Our PRO-92 tracked local systems well, though as mentioned in the user manual, the wrong talk group labels flashed occasionally on weak signals. It follows conversations when held on a chosen talk group, but it missed a few call-backs in the EDACS system. The scan speed is acceptable.

Will the good performance "scale up" when monitoring huge trunked systems? Will the PRO-92 miss more call-backs? We cannot answer this question with only small to medium sized trunked systems nearby.

## Overall

It's gratifying to see another manufacturer (GRE) offer a trunking scanner. The PRO-92 is anything but a simple first offering. It is a top quality, feature rich model with almost everything one could want, except full frequency coverage and auto store during search.

The PL and DPL squelch should be designed to function while in manual mode. That aside, the PRO-92's instantaneous PL/DPL code display is awesome. We like being able to use AA batteries in the PRO-92, too.

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# Stridsberg Engineering FLT201A FM Notch Filter and MCA204 Receiver Multicoupler

We recently tested two receiver accessories manufactured in the USA by Stridsberg Engineering. The FLT201A notch filter is designed to reject 88 - 108 MHz FM broadcast signals, and the MCA204 active multicoupler can be used to share one antenna among three VHF/UHF receivers.

## Stridsberg Engineering FLT201A FM Notch Filter

Living near a commercial or educational FM broadcast transmitter can be a nuisance to radio hobbyists. A friend who lived across the street from an FM broadcaster could testify to this. There were large groups of land mobile frequencies he couldn't scan without hearing drum beats or other music superimposed on the signals he sought to monitor. FM broadcast interference also made limit searching a labor-intensive operation as his scanner stopped on spurious responses generated within his receiver due to overload by the FM broadcaster.

Our friend tried different FM interference traps but each one proved to be a compromise. While they attenuated the 88 - 108 MHz broadcast band, their insertion loss was high, significantly reducing signals in other bands, too. In the end, our friend moved to another neighborhood and his FM broadcast problems disappeared.

If you are plagued by FM broadcast interference, but don't want to move to a new home, consider the new Stridsberg Engineering FLT201A (fig. 1), a notch filter designed to attenuate the 88 - 108 MHz broadcast band.

An ideal FM stopband filter would attenuate all signals between 88 and 108 MHz by a large, constant amount. You won't find an ideal filter selling at a hobbyist price.

Measurements made using a high end Hewlett-Packard spectrum analyzer and tracking generator show our FLT201A (s/n 002008) knocks down FM signals up to a whopping 66 dB near 94 MHz, falling off to about 30 dB at the 88 and 108 MHz band edges. Aircraft signals up to 125 MHz are attenuated, too.


**FIG 1.** *FLT201A notch filter is designed to attenuate FM broadcast signals.*

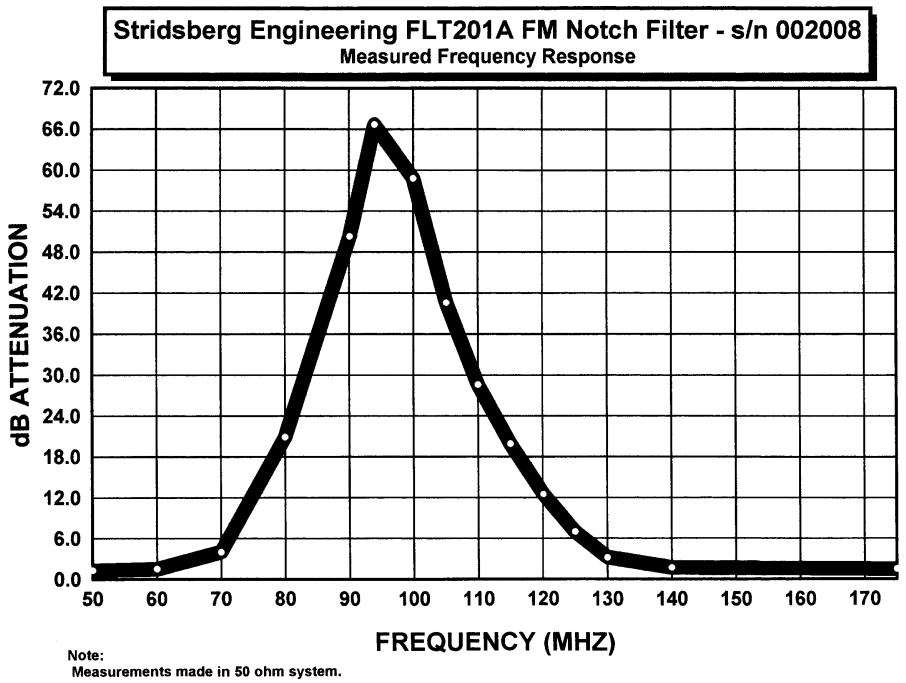
Like other Stridsberg products, the FLT201A is made in USA and looks bullet-proof. It's housed in a gray, cast metal box, with male and female BNC connectors. The bottom is held on by four flathead screws and each filter bears an individual serial number.

The Stridsberg Engineering FLT201A FM Notch Filter is priced at $39.95, a good value. Stridsberg sells them to the U.S. government and GSA numbers are available upon request. Whether hobbyist or bureaucrat, you can buy an FLT201A from Stridsberg Engineering, 354 Albert Ave., Shreveport, LA 71105 USA. The manufacturer maintains a tastefully designed web site at **www.stridsberg.com**.

## Stridsberg Engineering MCA204 Multicoupler

Past columns have discussed how to share one antenna among several receivers. We reviewed the Stridsberg MC202 two port passive multicoupler (splitter) in September 1997 and the Mini Circuits ZFSC-4-1 four port passive multicoupler in June 1999. Both are high quality splitters, though they attenuate signals by 4 - 7 dB.

The 7 dB insertion loss for a 4 port splitter doesn't matter much unless the signals you want to monitor are weak. In that



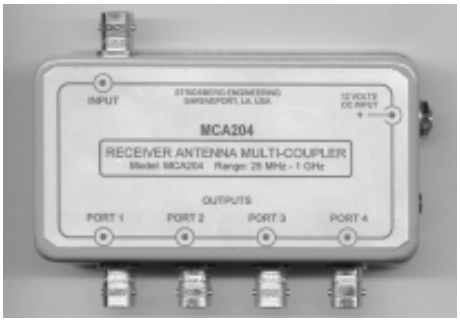
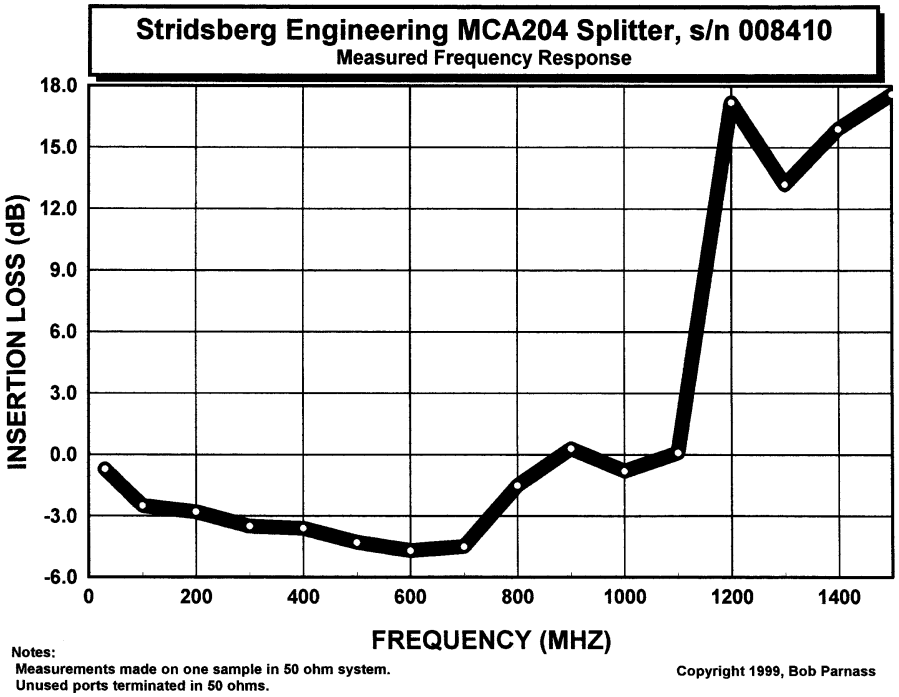



**FIG 2.** *Older version of MCA204 four port active splitter*


**FIG 3.** *Updated version of MCA204 four port active splitter.*




case, consider using an active multicoupler. An active multicoupler contains a low gain amplifier to compensate for circuit losses.

Stridsberg Engineering provided us with an MCA204 four port active multicoupler (fig. 2, s/n 008023) last year that proved to be defective. Stridsberg has since updated the design and graciously provided a newer MCA204 for testing (fig. 3, s/n 008410).

The MCA204 is made in USA, though a Chinese 12 VDC power adaptor is included. It is rated for 30 - 1000 MHz use, but being curious, we measured its frequency response up to 1500 MHz. Our new MCA204 provides a small gain of under 5 dB from 30 - 1000 MHz, except near 900 MHz where there's a tiny insertion loss of 0.3 dB. Our MCA204 insertion loss increased significantly below 30 MHz. Stridsberg Engineering offers the MCA104 model for use in the shortwave spectrum.

With its new mounting flanges and black label, the newer MCA204 looks different on the outside, and there have been improvements in circuitry as well. Stridsberg Engineering owner John Stridsberg wrote "the most significant difference with the newer couplers is the higher front-end dynamic numbers, due to change of amplifier. P1dB is now +13 dBm (decibels compared to 1 milliwatt) and the 3IP (3rd order intercept point) is at +23.5 dBm. The early units had the following; P1dB: +1 dBm and 3IP: +7 dBm."

"In practice this results in a very robust front-end that is able to handle very strong signals before substantial IMD (intermodulation) products occurs. Linearity is also much better in the new GaAs HBT (gallium arsenide heterojunction bipolar transistor) amplifier chip and that, of course, helps in reducing spurious mixing products. The latest revision of the MCA204 is dated October 1998 ..."

Though we didn't measure the MCA204's IMD performance, our insertion loss testing shows this to be a good product.

The MCA204 sells for $155 and is available directly from Stridsberg Engineering.

### Source for Used Plectron Receivers

We've written about the 1960s and 1970s vintage Plectron monitor receivers in past columns. Too bad Plectron is out of business.

Terry Marengi of TCS Communications Corp. wrote to say that his company sells used Plectron receivers in working condition for $75-$100. TCS may be able to provide some crystals and reeds, too. Contact Terry Marengi at TCS Communications Corp., tel. 1-800-TCS-XMIT or send email to TERRYTCS@aol.com.

# WHAT'S NEW?

**TELL THEM YOU SAW IT IN MONITORING TIMES**

## New from WiNRADiO

WiNRADiO, developer of the leading computer-hosted receivers, has announced the release of their new WR1550. Available both as an internal plug-in for desktop computers (WR1550i) and as an external module for portability (WR1550e), the new receiver boasts all of the features of its highly successful predecessor, the WR1500, yet offers better dynamic range to help overcome problems associated with strong signal overload.

The WR1550e and WR1550i are available for only $549.95 and $499.95 respectively from Grove Enterprises, PO Box 98, Brasstown, NC 28902-0098. To order call (800) 438-8155, or fax (828) 837-2216. E-mail: *order@grove-ent.com*.

## QRZ.com adds convenience

QRZ is a lot more than an amateur radio business – it's a vast source of information for the amateur operator as well. Now it's even easier to access using software called the "Jotter microportal." This enables the user to access and even search the QRZ Callsign Database lookup from your desktop without opening a web browser. A real-time ham radio news ticker can be custom filtered to bring just the amateur radio news you are interested in. Go to **www.qrz.com** for more information.

## Alinco Power Supply

The new Alinco DM-330MV switching power supply is called "communications grade," because it uses a clever circuit to reduce RF noise that such power supplies sometimes create. The DM-330MV has extensive filtering to reduce the problem, but if pulse-noise is still present, the user can switch in a Noise Offset Circuit™ to move the noise to a different frequency.

The power supply is small and lightweight (less than 5 pounds) and provides 30 amps continuous, 5 to 15 volts variable output. The user can select a preset voltage if desired. A lighted meter displays volts or current, plus short circuit, overload and over temperature conditions. Binding post, auto-lighter and snap-in terminals are provided for fixed, portable and test bench applications.

For information on a dealer close to you, contact Alinco, 438 Amapola Avenue, Suite 130, Torrance, CA 90501; 310-618-8616; **www.alinco.com**

## PowerPort TransPorter

How would you like a fully equipped 50 watt station you could carry with one hand?! Cutting Edge Enterprises, noted for its carrying case and portable power solutions, has come up with another winning combination: a carrying case designed to carry the 9 AH rechargeable PowerPort together with your Yaesu FT-90R mini-mobile transceiver.

The fully automatic charger

allows you to recharge the cell via AC, DC, or using the optional roll-up solar recharger. Accessory pockets hold your microphone, charger, and accessories.

For pricing and availability, contact Cutting Edge Enterprises, 1803 Mission Street, Suite PMB-546, Santa Cruz, CA 95060; 800-206-0115, email cee@cruzio.com.

## High Gain HT Duck Antenna

Talk about getting your ducks in a row ... MFJ's TeleFlex™ antennas are dual band, telescopic antennas for your handi talkie that can take all the abuse portable use can dish out and spring right back. The MFJ-1817 is 9 inches retracted and extends to 14-1/2 inches. On 2 meters, it's a full size antenna; on 440 MHz, it's a 1/2 wave.

The MFJ-1816 economy TeleFlex is six inches retracted

and 8-1/2 inches extended, so does not have the extra gain of the 1817. The third antenna picture is a fold-over antenna also in the 1800 series, but we have no information on it. For more information, see MFJ's website at **www.mfjenterprises.com**, call them at 1-800-647-1800, or write PO Box 494, Mississippi State, MS 39762.

## Star Trek wrist phone

Star Trek crew members Geordi La Forge (LeVar Burton), Scotty (James Doohan), Chekov (Walter Koenig), and others were expected to be on hand when Samsung Electronics unveiled its wrist phone at Comdex in Las Vegas. The Samsung phone (model SPH-WP10) is expected to be a big hit with the youth market; it also offers exceptional portability and it is less likely to get lost or stolen than conventional wireless handsets. The SPH-WP10 should appear on store shelves in April.

The watch-size cellular telephone uses CDMA (coded division multiple access) technology and comes with an embedded speech processor for voice access to a contact database. The product weighs just 39g (50g with battery) and measures only 67mm by 58mm by 20mm.

Samsung's new watch phone offers 90 minutes of continuous call time and 60 hours of standby time. It is also loaded with all the features users have come to expect in a handheld phone, including voice activated dialing, phone directory, ear microphone, and vibration alert. It comes with a graphic LCD that displays the current use mode through animation.

## Coming soon to a car near you

By July 2001, individual car owners can add satellite-delivered radio to their new car purchase. The service will likely add an additional $100 to a top of the line sound system, plus a monthly payment of $9.95 to subscribe to the service.

XM and CD Radio are two start-up companies who are gambling big in 100-channel packages that will offer specialty programming and digital-quality music. XM has signed a deal to put their receivers in General Motors cars, and CD has a similar deal with Ford.

## NeverLost

Wendy, Peter, and the Lost Boys in Never Never Land could have used this service. A joint venture by Orbital Sciences Corporation and the Hertz Corporation called Navigation Solutions, LLC, is installing 50,000 satellite-based car navigation systems to create the Hertz NeverLost® rental car service.

The system uses the 750NAV navigation system from Magellan, a subsidiary of Orbital Sciences. Once a destination is entered or chosen from a database, the in-car system provides turn-by-turn directions and voice prompts in a choice of seven languages. An Instant Locate Button can immediately display the vehicle's exact location on the screen (useful if the customer requires assistance from Hertz' Emergency Roadside Assistance Service).

Magellan is pursuing opportunities to make it automotive products available to individual car owners as an after-market option.

## Historic Calypso broadcast on two CDs

Fans of classic radio who also enjoy calypso music are in for a double treat with a pair of new CDs. In 1946, ethnomusicologist Alan Lomax broadcast "Calypso at Midnight" from New York City's Town Hall, featuring three top Trinidadian performers of the day. The program hasn't been heard for decades. But Lomax's wife Ruby recently found a dozen ten-minute-long transcription 78s in her closet. Two Rounder Records discs collect the first half of the historic show (everything but the ads) on Calypso at Midnight [11661-1840-2] and the second half on Calypso After Midnight [11661-18412].

Lomax's thoughtful interviews with singers Lord Invader, Duke of Iron, and Macbeth the


Great distinguish this from other collections of vintage calypso. Invader's jab at Morey Amsterdam, who stole his composition "Rum and Coca Cola," is particularly memorable. Folks who just want to hear the songs can program their CD players to avoid the spoken segments, since each occupies its own separate track. To skip the interviews would be to bypass the core of these recordings, though. Taken strictly as a musical performance, the Midnight discs have their faults. Between bouts of bad

miking and scratchiness, the sonics are substandard. Enjoyed as a groundbreaking broadcast, though, the Calypso at Midnight recordings are a blast.

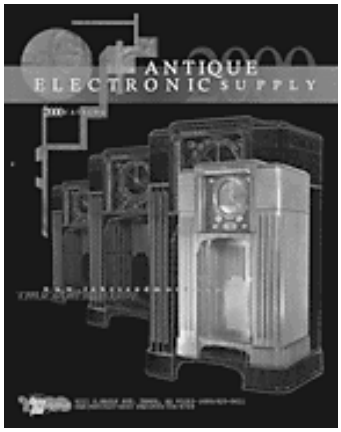
Technical glitches plague the second disc more than the first, so if you don't want to spring for both discs, stick to Calypso at Midnight. Gerald Clark's orchestra has unexpected trouble finding the right pace and key for the vocalists, and the mismatches and miscues come with increasing frequency as the concert progresses. Still, Calypso After Midnight has much to recommend it, including a fine though truncated musical "war" among the three calypsonians. Look elsewhere for better performed and produced versions of "Roosevelt in Trinidad," "Tongue Tied Mopsy," "Man Smart, Woman Smarter," "Rum and Coca Cola," and other standards. But as an evening's entertainment culled from classic radio, this pair of discs is tough to top. – Bob Tarte

## Essay booklet

The Ontario DX Association "Radio In My Life" Radio Fest 1999 essay contest attracted entries from 86 writers in 29 countries on five continents.

Writers were invited to: Tell about the importance of radio to you, how it has contributed to your life, why you love radio share your emotions and passions with other radio listeners around the world.

First place winner Terry L. Parsons of Hastings, Nebraska, was the recipient of a Grundig Yacht Boy 400PE Radio. All 86 essays are produced in a pamphlet which is available for $5.00 (Canadian or United States dollars) or 7 International Reply Coupons to: Ontario DX Association, P.O. Box 161, Station A, Willowdale, Ontario, M2N 5S8, Canada. You may also contact the Ontario DX Association via their web site **www.odxa.on.ca** or via e-mail at *odxa@compuserve.com*.




## Antique Electronic Supply

If you're as excited as we are about *MT*'s new "Radio Restorations" column, you may want to prepare for future columns by stocking up on catalogs to source those hard-to-find antique parts. You'll drool over the glossy catalog from Antique Electronic Supply – 72 pages of products and information on tubes, sockets, capacitors, transformers, resistors, books, grill cloth, test equipment, tools, etc. For your free copy, request it by e-mail at *info@tubesandmore.com* or by phone, fax, or mail to: Antique Electronic Supply, 6221 S Maple Avenue, Tempe, AZ 85283; 480-820-5411, (Fax) 800-706-6789 (U.S. and Canada) or 480-820-4643. You can also visit them at **www.tubesandmore.com**

## Recall Police Call #4

Volume 4 (IL, IN, KY, WI) of the new *Police Call* had a major printing problem and was delayed about 60 days.

## KLM antennas out of business

KLM Antennas of Monroe, Washington, reportedly closed its doors as of October 31. Industry sources say that Bruce Scott will continue to sell parts – at least for the time being – by e-mail orders only to *klm_antennas@msn.com*. No other information is available at this time.

## Klingenfuss Annual References

Joerg Klingenfuss has announced the new 2000 editions of his standard reference books for the shortwave listener. These books and the Super Frequency List on CD-ROM, allow you to mix and match according to your listening preferences.

*Guide to Utility Radio Stations*, now in its 18th edition, has grown to 612 pages of intriguing radio services on shortwave: aero, diplo, maritime, meteo, military, police, press, and telecom. 11,200 up-to-date frequencies from 0 to 30 MHz are listed, including communications from conflicts in the Balkan peninsula, Africa and Asia.

For monitors interested in advanced teleprinter and data systems monitoring and decoding, the new edition includes hundreds of new sample screenshots of state-of-the-art analysis/classification/decoding/display equipment such as Applied Signal Technology, Daimler-Benz Aerospace, Guillet, Medav, Rohde+Schwarz, and Wavecom.

No reference book is complete without back-up appendices to support the data fields in the list. The *Guide* lists just everything: abbreviations, call signs, codes, explanations, frequency band plans; meteofax, NAVTEX and press schedules; modulation types, all Q and Z codes, and much more.

The *Guide to Utility Radio Stations* is 40EU or about $42USD from Klingenfuss Publications.

If shortwave broadcasting is your primary interest, you can get the best of both worlds in the *2000 Shortwave Frequency Guide*. Stations are listed alphabetically by country and in a broadcast frequency list with 10,703 entries. These schedules are compiled by monitors worldwide who start from scratch each year. Clandestine broadcasts are listed by the country which is targeted by the broadcast.

It's the best of both world because another 11,247 entries cover all utility stations worldwide from the *2000 Guide to Utility Radio Stations*. The 584-page *Shortwave Frequency Guide* is like two handbooks in one for 30EU. (Or 60EU for both books)

With this much data at your fingertips, you may find the information more accessible on CD-ROM, and Klingenfuss has that, too. Not only can you browse through all that data in milliseconds, but you can search in next to no time for specific frequencies, countries, stations, languages, call signs, and times as well. For example: in the broadcast database BC2000, entering the words - bbc - en - 12:34 - takes you, within less than a second, to 35 entries with all BBC frequencies worldwide broadcasting in English at 12:34 UTC.

The database on CD easily connects to leading receiver control programs running under Windows 3.1 and Windows 95/98. The 2000 Super Frequency List on CD-ROM is 30EU from Klingenfuss Publications.

85 EU buys you all three references! Contact Klingenfuss Publications, Hagenloher Str. 14, D-72070 Tuebingen, Germany. Phone +49 7071 62830, Fax +49 7071 600849 or visit **http://ourworld.compuserve.com/homepages/Klingenfuss**.

These standard references are also carried by Grove Enterprises and other dealers. Contact Grove at 800-438-8155 for pricing and availability or visit the website at **www.grove-ent.com**

**Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, P.O. Box 98, 7540 Hwy 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or e-mailed to mteditor@grove-ent.com.**

# TRUNKING SCANNERS FROM GROVE

## Realistic PRO-92

Follow all three leading trunking systems—Motorola (I, II, I/II hybrid), GE/Ericsson (EDACS), and Johnson/Uniden (LTR)—as well as conventional communications with this potent handheld! The **PRO-92** scans up to 10 trunked and conventional systems simultaneously, and you can enter alphanumeric identifications into its 500 memory channels for easy recognition!

Even better, this feature-packed portable receives NWS local weather alerts, and has self-contained CTCSS decoding! An optional cloning interface automatically programs other units.

Covers 29-54, 108-174, 380-512, and 806-960 MHz (less cellular). Includes flex antenna and belt clip. Requires 6 AA alkaline or rechargeable cells, and/or AC adaptor/charger.

**ACCESSORIES**

| | | | | | |
|---|---|---|---|---|---|
| ANT 14 | Austin Condor flex whip | $29.95 | DCC 3 | Universal DC adaptor | $12.95 |
| CAS 22 | Leather case | $19.99 | PWR 22 | AC wall adaptor/charger | $8.95 |

**ORDER SCN 46 Only $329.95**

plus $12 UPS shipping or US Priority Mail

## Uniden BC-245XLT

This hand-held communications marvel has stunned the scanner marketplace with its dual trunking capabilities! Imagine scanning through conventional channels as well as both Motorola and GE-Ericsson EDACS channels simultaneously, stopping to hear any communications—your choice—on any of these systems!

With land, sea, and air frequency coverage of 29-54, 108-174, 406-512, and 806-956 MHz (less cellular), and 300 memory channels in 10 banks, this potent Bearcat even offers a nine-pin cable connector to permit downloading of computer databases. The information-packed LCD display is backlit for easy night viewing.

Factory pre-programmed search ranges target active police, fire/emergency, air, marine, railroad, and weather channels. Standard features include:

- Individual channel lockout
- Search
- Channel-selectable delay
- Data skip
- 10 priority channels
- Three-day memory backup without batteries or power, and
- Lightning-fast turbo scan!

**ORDER SCN 35 Only $229.95**

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## Realistic PRO-2052

For desktop scanning, the low-profile **PRO-2052** follows Motorola I, II, I/II hybrid as well as GE/Ericsson (EDACS) trunked systems. Extended frequency coverage provides 29-54, 108-512, 806-960 (less cellular), and 1240-1300 MHz! Built in weather alerts can be encoded for your specific SAME location. The RS232C serial interface invites computer control, data uploading and downloading, and similar-unit cloning.

With 20 priority channels, data skip, and search skip, this base unit operates from its own AC adaptor, or from an optional mobile cord. Includes detachable antenna and nationwide trunked frequency list.

**ACCESSORIES**

| | | |
|---|---|---|
| DCC 16 | Cigarette lighter mobile power cord | $3.95 |
| ANT 7 | Scantenna with 50 feet coax | $49.95 |
| ANT 30 | Magnetic mount Stealth antenna | $34.95 |

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# WASHINGTON WHISPERS

By Fred Maia, W5YI
fmaia@prodigy.net

• **On October 1st, Great Britain's Radiocommunications Agency (RA) proposed to extend spectrum pricing into all areas of radio use.** The new fees will reflect the value of the spectrum being used and will result in lower fees for the majority of smaller businesses who share channels, although it may mean higher fees for users of exclusive or congested spectrum.

Spectrum pricing helps to balance spectrum availability with demand and helps to promote efficient spectrum use and management.

The RA said "It is also recognized that spectrum pricing is not appropriate for licensing certain areas, such as aeronautical, maritime, amateur and citizen's band and the testing and development of new services."

While spectrum pricing will not be applied to UK ham tickets, the current annual £15 (US $24) license fee apparently will continue. (No fees are collected from licensees under 21.) There are approximately 60,000 radioamateurs in Great Britain. Comments close on Dec. 31, 1999.

On October 26th, the RA released another proceeding looking toward establishing the use of RadioLANs (radio local area networks, or RLANs) in Great Britain. RLANs are short range, high data rate, mobile or portable equipment operating in the 5-cm frequency band between 5.150 to 5.875 GHz. The UK has a 5-cm shared ham band and regulators are looking at permitting limited amateur radio access to the Internet for British amateurs by the turn of the year.

The UK national amateur radio society, the *Radio Society of Great Britain*, is very interested in this new initiative. The closing date for the "consultation" is Friday, January 28, 2000.

• **The FCC has begun a massive restructuring of its bureaus.** In testimony before the House Subcommittee on Telecommunications, FCC Chairman William E. Kennard said "Just as the internal combustion engine, the telephone, and the railroad brought about our country's transformation from an agricultural to an industrial society, the microchip, fiber-optic cables, digital technology, and satellites are fueling our transition from an industrial to an information-age society. As the marketplace changes, so must the Federal Communications Commission (FCC). "

"In five years, I expect the U.S. communications markets to be characterized by vigorous competition that will greatly reduce the need for direct regulation."

"I believe that in that same time period, the FCC will change radically from what it is today. The American consumer does not switch from wireline phone to wireless phone, and think 'Well, now I'm moving from the Common Carrier Bureau to the Wireless Bureau.'

"The new driving functions are not *types* of technologies, but procedures that apply to *all* technologies: Policy, Licensing, Enforcement, and Consumer Information. Those are the drivers at the new FCC.

"They replace the old drivers of the Common Carrier, Wireless, Cable and Mass Media Bureaus, the regulatory niches in which many industries have had to fit.

"I am pleased to announce that our Congressional oversight committees have approved our proposal for an Enforcement Bureau and a Consumer Information Bureau."

The first of the four new bureaus went into operation on November 8th. The balance of the bureaus will be restructured during the next five years. But Congress thinks this is too slow.

• **Who would you guess made the following statement about the FCC?** "They are engaged in shakedowns, extortions, and things that fall outside the formal regulatory process. The commission has been very effective in shaking down companies [and deciding] which communities get served first, which communities get served last, [and] who the assets get spun off to."

FCC Commissioner Harold W. Furchtgott-Roth, a 1997 Clinton appointee made that assessment of the FCC at a (September 26-28) Hudson Institute conference entitled "Defining the Digital Economy" in Jackson Hole, Wyoming. He is the sole economist among the agency's four other lawyers-turned-commissioners.

Born in Knoxville, TN, Commissioner Furchtgott-Roth holds degrees in Economics from the Massachusetts Institute of Technology and a Ph.D. in Economics from Stanford University

• **On September 15th, the FCC agreed to allow cell phone companies to distribute handsets equipped with scaled down global positioning satellite, or GPS, technology** that pinpoints to within 15 feet the location from which a call is made.

Police and paramedics will be able to aid callers in distress faster by automatic tracking of 911 calls from cellular phones. The handset contains circuitry that transmits the location to orbiting satellites.

But not everyone is pleased. Privacy advocates say the technology can be used to track users without their consent. Users can avoid surveillance, however, by turning off the GPS function.

Developed by Lucent Technologies' Bell Labs, the technology will allow cellular network operators to easily meet an October 2001 FCC mandate requiring that all cell phones be able to locate 911 dialers. The technology will be available in the United States in the second half of 2000.

• **Hate it when a cell phone goes off in a movie?** "Cellphone buster" creates a haven of peace in a concentrated geographical area – Netline Communications Technologies Ltd., a small Israeli startup company in Tel Aviv, is causing quite a commotion with their "C-Guard Cellular Firewall." (See "Communications," Nov 1998.) The white wall-mounted cigar-box size device blocks cell phone use – both sending and receiving – within a hundred-yard radius.

A common use is to establish "ring free zones" in movie theaters, restaurants, libraries, churches, concert halls – anyplace where noise annoys and/or distracts other people ...and in hospitals, laboratories and aboard aircraft where electromagnetic radiation is thought to interfere with sensitive equipment.

The device is based on electronic warfare technology, and basically prevents the handshake between the handset and the base station in a designated area. The receiver/transmitter device detects the activity of any nearby wireless device and emits bursts of static on the same radio frequency.

Netline markets the Firewall over the Internet at <**http://www.netline.co.il/default.htm**> for roughly $1,000.

Although the use of transmitters to jam wireless transmissions in certain restricted areas is apparently legal in many countries, it is *not* lawful in the U.S. Publicity about the gadget prompted the FCC's Office of Engineering and Technology to issue a Public Notice on October 13th. It warns anyone who sells, purchases and/or uses such technology in any way in the United States to prevent or jam cellphone operation is risking harsh penalties. "Violators are subject to fines as high as $11,000 for each violation or imprisonment for up to one year." The equipment can also be seized and forfeited to government, the FCC said.

The firm says the device is being sold to American customers who they would not identify. Some customers are buying the box to prevent information from going out of secure installations or offices.

The company is developing a variation of the basic product which permits some cell phones to work and zaps others. The successor will allow, for example, doctors to be reached at a restaurant while calls to other diners would be barred.

# LETTERS TO THE EDITOR

CONTINUED FROM PAGE 7

## Splinter Groups?

In response to a query by Kevin Carey in the November *Below 500 kHz* column regarding FAA beacons operating on .51 kHz "splinter" frequencies, Dave Larrabbee, Chief Watch Officer of the FCC's HF Direction Finding Center, wrote this reply: "In reading your article in November *Monitoring Times* I noted your comment about 260.51 kHz as a 'listed' frequency for a beacon.

"This is probably the assigned or average frequency. In this case the carrier would be 260.0 kHz and the keyed component would be on 261.02 kHz (+1020 Hz note as you mentioned, I think you'll find any of the .51 assignments to be keyed in USB only). 260.51 is the average of all the authorized (or expected) components the emitter is radiating.

"The same holds true for many other allocations in other services. Typically, authorizing agencies (FCC, FAA, NTIA, ITU, etc.), are concerned about the center frequency and bandwidth. User groups are concerned about how to use it, so worry about carrier and sidebands."

## Beacon Site Search

"*MT* readers interested in online information on airport beacons will find **http://www.airnav.com** a useful web site. They offer information on radio aviation navigation aids (VORs, NDBs, TACANs, etc) including frequency, power, owner, location, etc. The site also offers detailed information on airports. To access the data, just type in the 3 letter airport identifier, or you can browse by state."

– *Bryan West, K2BW, Gaithersburg, MD*

## TIS Turnover

"I enjoyed Patrick Griffin's article on TIS stations in the November 1999 issue. But listening to 1650 kHz, all I could hear was KGXL, not KKTR as listed by Griffin. Could this be a replacement call?" Bob Grove did some research on this query (unfortunately the reader's name was lost when he forwarded the correspondence to me for *Letters*) and replied: "It certainly could. We searched the FCC files and found no KKTR, but there is a new license for KGXL in Torrance, California."

## Applause for MT Express

A number of adventurous readers have been trying out the new *MT Express* online subscription. Our Antarctic feature by Chuck Kimball indirectly came about when I replied to the following email from fellow technician, Bruce Blackburn.

"I wanted to express my pleasure and gratitude for *MT Express*. I am a communications technician for Antarctic Support Associates. Two days prior to deploying to McMurdo Station you announced the e-version of *MT*. Last year I had to wait up to 2 months for my copy of *MT* to arrive. This year I am able to get it before it even arrives at my home in the States. Your trying to keep the magazine up to date and current is one of the reasons I have been a subscriber since the time of the large format newsprint version.

"Keep up the great work and I'll be watching for the next issue."

*– Bruce Blackburn, McMurdo, Ross Island, Antarctica*

Antarctica Adventures http://www.gmra.org/n0nhp/antarctica/index.htm

From John Mayson comes this comment and question: "I don't know whose idea it was to have an e-copy of *MT*, but it's a SUPER idea. I've already asked for a hard copy renewal and electronic subscription for Christmas (gotta see which I REALLY like). I downloaded the August edition and really like it.

"Any plans to make back issues available on CD-Rom?"

The answer to that, John, is "absolutely, yes !" Be watching for a CD-ROM of *Monitoring Times* 1999, Volume 18, to become available for sale at a very reasonable price.

Andy Domonkos sent this email: "I just added the e-version of *Monitoring Times* to my regular subscription. That was an excellent idea, and I am glad you had the progressive insight to go forward with such an endeavor. You've just resolved my frustration with the post office guerilla handling problem that plagues my magazine subscriptions. I am looking forward to the best of both worlds now! Thanks again!"

## MT Web pages

"Just a quick note to tell you how much I

***Continued on page 106***

# STOCK EXCHANGE

*Monitoring Times assumes no responsibility for misrepresented merchandise.*

Ads for **Stock Exchange** must be received 45 days prior to publication date. All ads must be paid in advance to *Monitoring Times*.
**Ad copy must be typed for legibility.**

**NON-COMMERCIAL SUBSCRIBER RATES:** $.25 per word — *Subscribers only!* All merchandise must be personal and radio-related.

**COMMERCIAL, NON-SUBSCRIBER, AND MULTIPLE SALES RATES:** $1.00 per word. Commercial line ads printed in bold type.

**1-3/4" SQUARE DISPLAY AD:** $50 per issue if camera-ready copy or, $85 if copy to be typeset. Photo-reduction $5 additional charge. For more information on commercial ads, contact Beth Leinbach, 828-389-4007.

***NOTICE:*** *It is unlawful to buy cellular-capable scanners in the United States made after 1993, or modified for cellular coverage, unless you are an authorized government agency, cellular service provider, or engineering/service company engaged in cellular technology.*

**Bearcat BC245/235 NiMH extended battery pack BP-1600 $24.50, new from LEE ELECTRONICS. 1-800-578-6006, www.LeesElect.com**

**EXPERT RADIO REPAIR/ALIGNMENTS. MILITARY/AMATEUR/S.W.L. Fast, Economical. R-388, R-389, R-390, R-390A, R-392, R-648/ARR-41, R-725, SP-600, T.M.C. CV-591A, CV-1758A. Collins, Hallicrafters, Hammarlund, R-392 Power Supplies, R-390 Power cords. Rick Mish/MILTRONIX 419-255-6220 9-9 EST Fax 24 hrs. INTERNATIONAL WELCOMED.**

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WANTED: Phillips DC777 SW auto receiver, any condition. Phone/FAX 516-223-4638. Contact Earl.

***Letters, continued from page 105***

appreciate Grove / you posting the updated allocations to the Grove web page for free download in the *MT* section. While I subscribe to *MT*, it is of course much easier to deal with as virtual text. This will be a major updating of all of my personal records. I don't think most people in the hobby appreciate what a great resource this is and how much time and effort the Grove staff volunteer for the sake of the hobby. Great work, please keep it going!"

*-Ted Moran / CARMA List Admin / Chgo Area Radio Monitoring Association*

Thanks, Ted, for recognizing that the listings that appear on the *MT* web page are the result of labors that often go above and beyond the paycheck! The new allocations from the *Service Search* column are what Ted is specifically referring to. Since posting these on the website is a free service we provide for our readers, it sometimes doesn't get done when time is pressing, but it's part of our ongoing effort to build the website into a valuable resource. You can help in this effort by submitting your own verified listings to share with the thousands of hobbyists who visit our site daily.

I think you'll find this edition of *Monitoring Times* packed full of more information than ever, as we continue to increase our depth of scanner coverage and our breadth across all aspects of monitoring. Help us stay Number One for full-spectrum monitoring into the next millennium; turn your friends on to *Monitoring Times*!

*– Rachel Baughn, editor*

Your letters and comments are welcome at Letters to the Editor, Rachel Baughn, PO Box 98, Brasstown, NC 28902 or at mteditor@grove-ent.com.

## INDEX OF ADVERTISERS

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# CLOSING COMMENTS

*By Bob Grove, Publisher*

# A Scanning Hall of Fame

## A Guest Editorial by Robert Wyman

The scanning hobby has come a long way in the last 30 years in terms of radio technology and hardware as well as the knowledge and professionalism of the "hobbyists." Many have focused on the hardware side by voluntarily conducting in-depth testing and evaluation sessions which have steered consumers toward the best values and manufacturers toward the production of better products. Others have chosen the operational side by learning about frequency bands, allocations, local licensees, and daily channel uses, in turn sharing their knowledge and building extensive frequency lists for almost every geographic region and event.

The "hobby" has blossomed into a bonafide adjunct of the radio communications industry, with members ranging from public safety retirees to active police, fire, rescue, emergency management, disaster relief, military, security and RF engineers. We may all have started as "wannabees" with our crystal-controlled scanners, staying up late at night just to listen to the local policeman or fire station or airport...but we've grown into responsible communication experts with a unique history and a vast range of specialized information.

It is this history and range of information, as well as the consistent participation of members in matters of public safety, that justifies a "Lifetime Achievement Award" for the scanning hobby.

Contrary to the negative image often promoted by factions of the communications industry, the hobby is not a sanctuary for a criminal element. Within the ranks of *MT* readers, we DO NOT have criminals, we have heroes: people who have seen the potential for an industry and pushed for better hardware, greater understanding and more respect...often overcoming tremendous pressures from those without such foresight.

I'd like to nominate four people for the first group of Lifetime Achievement Awards:

**Bob Grove**, of course, for his leadership and vision that transformed a loosely-knit group of hobbyists into a worldwide network of communication experts. Bob has inspired thousands of young people to embrace the radio hobby as a positive, enjoyable recreational activity...and hundreds of hobbyists to explore the communications industry as a career path.

Bob's "former" career as a local educator never really ended...he just became the nation's "monitoring" teacher. I'm confident everyone will agree that Bob almost single-handedly started the worldwide network of monitoring enthusiasts that exists today, and has been the most powerful force of influence with scanner manufacturers. I have many fond memories of discussions with Bob over the years, each of which left me feeling positive and empowered concerning my own efforts in the hobby.

**Bob Parnass**, for being perhaps the most technologically-connected person of the century. We all know names like Bill Gates and Steve Wozniak, and may know of a dozen other pioneers and famous hobbyists that made headlines, but Bob has been the most visible ambassador of technology for the common hobbyist.

Although I've never met Bob, I remember being in awe every time I saw a message posted on CompuServe starting in 1981 or so, coming across my 300-baud modem on an Osborne 1 computer, that was signed "Bob Parnass / AT&T Bell Labs." Wow. This guy was in the techno capital of the world, and he was sharing his radio and computer data with me! Accessibility and down-to-earth qualities such as Bob's demonstrate how technology and knowledge don't have to result in the secretive and aloof behavior often adopted by fellow hobbyists.

**Bill Cheek**, for "pushing the envelope" and giving consumers what manufacturers would not give...and later, what government sought to disallow. Bill is a pioneer in every aspect of the scanning hobby.

From some of the first frequency lists in the RCMA (Radio Communications Monitoring Association) *Scanner Journal* to circuit diagrams and modification schemes that made everyone's jaw drop in amazement, Bill almost single-handedly brought back the 1960s and "Heathkit" days, when hobbyists armed only with soldering irons and test meters feverishly attacked their weekend radio projects in an effort to start the following Monday with a new toy or testing device or "gadget."

Bill's scanner modifications, criticized recently and penalized severely, started with the same simple premise that has guided each of us: the radio spectrum is public property. Bill, another man I have never met, just expanded on the theme. If a consumer wanted something that a manufacturer arbitrarily filtered, Bill just removed the filter. If a consumer wanted something a manufacturer left out, Bill just fabricated a new component.

As we now know, the spectrum is no longer public. Instead, portions have become the exclusive playground of trade associations and private entities...the very groups that attempt to characterize the hobby as being one of criminals instead of public safety professionals. Bill's efforts were groundbreaking and his accomplishments should not go unnoticed.

Finally, the indefatigable **Larry Van Horn**. Larry's passion for the hobby is eclipsed only by his integrity and wit. His mission of late has been the dissemination of verified radio information and the elimination of rumors, speculative listings and obsolete data. This is a monumental task, but I'm confident he will succeed, just as he has succeeded in his previous "impossible" missions: getting satellite communication data out to the hobbyist community; helping to organize the scanning community's vast federal and military frequency allocation records, investigating the government's "secret" sites (such as Cheyenne Mountain and Area 51), and providing insight to agency operations beyond the reach of most monitoring enthusiasts.

Since joining the staff at *MT* headquarters, he has also demonstrated a remarkable ability to juggle multiple projects, meet killer deadlines, and synthesize enough information to fill a library.

There are other familiar names whose substantial contributions no doubt render them just as worthy of recognition, but there are few who go as far back or who remain as actively committed to this scanning hobby. On behalf of us all, thank you, Bob Grove, Bob Parnass, Bill Cheek, and Larry Van Horn.

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**Hear MORE of what's out there.** Pick up more amateur, marine and shortwave broadcasts. The new 'R75 covers from **0.03 – 60.0 MHz*** – wider than most other HF receivers.

**Pull out the weak signals.** The IC-R75 sports a remarkable arsenal of signal detection weapons, ready for your command: A **triple conversion** receive system rejects image and spurious signals. An **automatic notch filter** reduces interference by minimizing "beat" and "howl" signals. Use **Twin Passband Tuning (PBT)** to zero in on signals by shaping the IF passband. ICOM's all new **Synchronous AM detection (S-AM)** technology reduces signal fading in AM broadcasts. Optional **Digital Signal Processing (DSP)** noise reduction in the AF stage converts analog SSB, AM and FM signals to crisp, clear audio output (you'll hear the difference on the 'R75's **large front mounted speaker**). Further tailor the 'R75 to meet your listening needs by installing **up to two optional filters.**

There's much more. Plan to test drive a surprisingly affordable new IC-R75 at your authorized ICOM dealer's showroom soon.

# ICOM brings you the BEST in wide band receivers

**FREE CD**

Get a frequency database on CD ROM with each new IC-PCR1000. Limited time offer. See your dealer for details.

Computer not included.

## IC-PCR1000

**The original "World in a Little Black Box".** 100% PC hardware external. Impressive 0.01 –1300 MHz* wide band reception, all modes. Listen to your favorite broadcasts while working in foreground applications. Designed for Windows® 3.1 or 95.

"The PCR1000 has something to intrigue and satisfy everyone. This is a fun product." – *QST, 7/98*

## IC-R8500 The expert's choice.

0.5 – 2000 MHz*; commercial grade; all mode; IF shift; noise blanker; audio peak filter (APF); 1000 memory channels; built-in CI-V command control and RS-232C port for PC remote control with ICOM software for Windows®.

"If you want a receiver that is both a superior world band radio and a solid scanner, the new Icom IC-R8500 is the best choice."

– *Passport to World Band Radio, 1998*

**SAVE $50**

On the IC-R10, PLUS receive free PC software and connection cable. Limited time offer. See your dealer for details.

## IC-R10 (left) Advanced performance and features.

0.5 – 1300 MHz*; all mode; alphanumeric backlit display; attenuator; 7 different scan modes; beginner mode; 1000 memory channels; band scope; includes AA Ni-Cds and charger.

## IC-R2 (right) Excellent audio, tiny package.

0.5 – 1300 MHz*; AM, FM, WFM; easy band switching; CTCSS decode; 400 memory channels; large internal speaker; priority watch; auto power off; MIL SPEC 810 C/D/E (shock/vibration); weather resistant; includes 2 AA Ni-Cds and charger.

**SAVE $50**

On the IC-PCR100. Limited time offer. See your dealer for details.

## IC-PCR100 A little different look, a little fewer features, a little lower price.

Enjoy wide band 0.01 – 1300 MHz* reception on AM, FM and WFM. Outstanding performance. Designed for Windows® 95 or 98. Download the full version software today: <www.icomamerica.com>


Computer not included.

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